The Journal of Experimental Education

A periodical report of scientific investigations relating to child development, curriculum, learning, teaching, supervision, measurements, statistics, and experimental techniques.

Vol. XXIX | September 1960 | No. 1

CONTENTS

		PAGE
Children's Spelling Needs and the Implications of Research	*Arnie E. Richmond*	3
Public Attitudes Toward Education	*Donald B. Black et al.*	23
Scholastic Achievement at Iowa State College Associated with High School Size and Course Pattern	*Irvin T. Lathrop*	37
A Study of Undergraduate Records of Graduates from Hunter College Who Later Earned Doctorates	*Edith B. Chase*	49
Syllogistic Reasoning	*George N. Beaumariage, Jr.*	61
Analysis of Adolescents' Responses to the F Scale	*Jack R. Frymier*	73
Comparison of Academic Achievement, Aptitudes, and Interest Patterns of Two-Year Technical Students and Four-Year Degree Candidates in Engineering	*Louis M. Herman and Martin L. Zeigler*	81
An Objective and Empirical Study of the Effects of Laboratory Experience in a Professional Education Course Prior to Student Teaching	*Dan Cox*	89
A Comparison of Three Ways of Phrasing Likert-Type Attitude Items	*Willard E. North and John Schmid*	95
Motives in Selecting Elementary and Secondary School Teaching	*Gerhard Lang*	101

$7.50 A YEAR | PUBLISHED QUARTERLY | $1.90 A COPY

Published by Dembar Publications, Inc.,
Madison 3, Wisconsin.
Second class postage paid at Madison, Wisconsin

EDITORIAL BOARD

A. S. Barr, Chairman, Professor of Education, University of Wisconsin, Madison 6, Wis.

Jacob O. Bach, Head, Education Research Bureau, Southern Illinois University, Carbondale, Illinois. Editorially responsible for materials on university field research.

Arthur T. Jersild, Professor of Education, Teachers College, Columbia University, New York City. Editorially responsible for materials on child welfare, guidance, and development, published each December.

H. H. Remmers, Professor of Educational Psychology, Director Division Educational Reference, Purdue University, Lafayette, Indiana. Editorially responsible for materials on learning, teaching and supervision, published each September.

J. Wayne Wrightstone, Director, Bureau of Educational Research, Board of Education of the City of New York, Brooklyn, New York, 110 Livingston Street, Brooklyn, New York. Editorially responsible for materials on curriculum construction, published each June.

CONTRIBUTING EDITORS

Emmett A. Betts, Director, Betts Reading Clinic, Haverford, Pennsylvania.

Leo J. Brueckner, Professor Emeritus, University of Minnesota, Minneapolis, Minnesota.

Oscar K. Buros, Professor of Education, Rutgers, The State University, New Brunswick, New Jersey.

Guy T. Buswell, Executive Secretary, American Educational Research Association, 1201 Sixteenth St., N.W., Washington 6, D. C.

Harold D. Carter, Professor of Education, University of California, Berkeley 4, California.

Leslie L. Chisholm, Associate Professor of Education, State College of Washington, Pullman, Washington.

Herbert S. Conrad, Technical Consultant, College Entrance Examination Board, Princeton, New Jersey.

Stephen M. Corey, Professor of Education, Teachers College, Columbia University, New York, New York.

Robert A. Davis, Professor of Educational Research, George Peabody College for Teachers, Nashville, Tennessee.

Harl R. Douglass, Director of College of Education, University of Colorado, Boulder, Colorado.

Harold A. Edgerton, Director, Occupational Opportunities Service, Professor of Psychology, Ohio State University, Columbus 10, Ohio.

John C. Flanagan, Professor of Psychology, University of Pittsburgh, Pennsylvania.

Carter V. Good, Dean, College of Education and Home Economics, Teachers College, University of Cincinnati, Cincinnati 21, Ohio.

Robert W. B. Jackson, Assistant Professor of Educational Research; Assistant Director, Department of Educational Research, Ontario College of Education, University of Toronto, Toronto, Canada.

Harold E. Jones, Professor of Psychology and Director, Institute of Child Welfare, University of California, Berkeley 4, California.

D. Welty Lefever, Professor of Education, University of Southern California, Los Angeles, California.

Edward A. Lincoln, Consulting Psychologist, Halifax, Massachusetts.

Irving Lorge, Professor of Education, Executive Officer, Institute of Psychological Research, Teachers College, Columbia University, New York 27, New York.

A. R. Mead, Emeritus Director of Educational Research, University of Florida, Gainesville, Florida.

T. E. Newland, Professor of Education, University of Illinois, Urbana, Illinois.

C. W. Odell, Professor Emeritus of Education, University of Illinois, Urbana, Illinois.

Willard C. Olson, Dean, School of Education, University of Michigan, Ann Arbor, Michigan.

Walworth R. Plumb, Chairman, Division of Education and Psychology, University of Minnesota (Branch), Duluth, Minnesota.

S. L. Pressey, Professor of Educational Psychology, Ohio State University, Columbus, Ohio.

William Reitz, Professor of Education, College of Education Examiner, Wayne University, Detroit 2, Michigan.

Henry D. Rinsland, Professor of Education and Director of Educational Research, The University of Oklahoma, Norman, Oklahoma.

Robert T. Rock, Jr., Professor of Psychology, Head of Dept. of Psychology, Graduate School, Fordham University, New York City.

Phillip J. Rulon, Professor of Education, Harvard Graduate School of Education, Cambridge 38, Massachusetts.

John Schmid, Research and Evaluation Psychologist, Lackland Air Force Base, San Antonio, Texas.

Louis G. Schmidt, Associate Professor of Education, School of Education, Indiana University, Bloomington, Indiana.

David Segel, Consultant, Department of Guidance Services, City Schools, Albuquerque, New Mexico.

Helen Thompson, Assistant Clinical Professor in Clinical Psychology, New York University Bellevue Medical Center, 120 East 75th Street, New York 21.

Robert L. Thorndike, Professor of Education, Chairman of Department of Psychological Foundations and Services, Teachers College, Columbia University, New York City.

Herbert A. Toops, Professor of Psychology, Ohio State University, Columbus, Ohio.

Maurice E. Troyer, Vice President, Japan International Christian University, Tokyo, Japan.

Helen M. Walker, Professor of Education, Teachers College, Columbia University, New York City.

Guy M. Wilson, Emeritus Professor of Education, Boston University, 33 Pine Street, Wellesley Hills, Massachusetts.

Paul A. Witty, Professor of Education, Director of Psycho-Educational Clinic, School of Education, Northwestern University, Evanston, Illinois.

Ernest R. Wood, Dean, Rocky Mountain College, Billings, Montana.

D. A. Worcester, Visiting Professor of Education, University of Wisconsin, Madison, Wisconsin.

DEMOCRAT PRINTING COMPANY
MADISON, WISCONSIN

The Journal of Experimental Education

PUBLISHED QUARTERLY

Copyright 1960 by

DEMBAR PUBLICATIONS, INC.
Madison 3, Wisconsin

JOURNAL OF EXPERIMENTAL EDUCATION
(Volume 29, Number 1, September 1960)

CHILDREN'S SPELLING NEEDS AND THE IMPLICATIONS OF RESEARCH

ARNIE E. RICHMOND
Tampa, Florida

ALTHOUGH MANY spelling investigations have been carried out during the past fifty years or more, the results achieved in the teaching of spelling have not been satisfactory when measured by the effectiveness with which children spell in situations that call for written expression. The memorization of a list of isolated words, the principal approach to the learning of spelling in the past, failed to produce efficient spellers. Likewise, the attempts to master the study lists of the present decade are failing to develop adequate spelling ability by a large percentage of children.[1]*

Leading authorities are of the opinion that we do have available professional knowledge based on research that would go far toward preventing and solving the spelling problem if this knowledge had been put into practice in the classroom. In view of this situation, the writer was stimulated to conduct a classroom experiment utilizing selected professional knowledge in an attempt to improve the spelling ability of the pupils.

Purpose of This Study

This study was made (a) to determine the spelling needs of the pupils of a sixth grade class through classroom research and experimentation and (b to suggest procedures for spelling instruction to meet those needs by utilizing the implications of scientific investigation and expert opinion.

No attempt is made to present a complete spelling program. It is the opinion of the writer that a spelling program, to be most effective, must evolve from the needs of a particular group of children under the direction and guidance of the teacher. However, basic procedures, considerations, and generalizations applicable to any group in spelling instruction are, the writer believes, inherent in the investigation.

Scope and Background of Study

This study was limited to a suburban consolidated twelve-teacher school serving the community of Landover Hills, Maryland. With the exception of initial data to determine the general spelling competence of the school as a whole in the spontaneous writings of the children, the study was further limited to forty-one pupils of a sixth grade class.

Most of the pupils came from average middle-class homes. The average mental age of the pupils at the beginning of the study in January, as determined by the California Test of Mental Maturity, Intermediate, Short Form,[2] was 145 months with a range from 115 months to 186 months. The I.Q. ranged from 76 to 136 with an average of 104. On the Progressive Achievement Test, Form AA,[3] the average grade placement for reading vocabulary was 5.5, for reading comprehension 6.6, and for language 6.5.

The study extended over a period of five months from January to June. However, basic classroom organization and teaching procedures described later in this section had been established in the preceding months of the school year.

Sources of Data and Procedures

Two chief sources of data were utilized in this study. These were (a) the writings of the pupils in the school, and (b) the professional materials of outstanding educators in the fields of spelling and related areas.

The writings of the pupils were used as sources of data in two ways--first, in determining general spelling competency and in error analysis; and second, for individual word lists. The use of the individual lists will be discussed later in this section.

The Spontaneous Writings in Grades III

* Footnotes will be found at the end of the article.

Through VI. As a means of evaluating the general spelling competence of the school as a whole at the beginning of the study, each pupil in Grades III through VI was asked to write a story about any topic of interest, no stipulation being made as to the length of the story. The children were simply asked to spell as well as they could without the help of the teacher. Their spelling errors in these stories were analyzed in terms of all errors made by each grade group, all the errors in the group being pooled.

The Spontaneous Writings of the Sixth Grade Experimental Group. For the sixth grade experimental group, the spelling errors in the January stories were further analyzed to determine:

1. The actual words misspelled for the grade group and for the individual pupils; the repetition of errors for all the pupils; and the most frequently misspelled words.

2. The types of errors made in the spontaneous writings of the children.

3. The occurrence of the misspelled words in (a) The Pupils' Own Vocabulary Spellers,[4] (b) A Basic Life Spelling Vocabulary,[5] and (c) The 2,000 Commonest Words for Spelling.[6]

Again in June, each pupil of the experimental group was asked to write another story. These stories were analyzed as described above and comparisons made with the results of the first stories.

The Sources of Words for Spelling Study. To meet the individual writing needs of the pupils, two main sources of words were used. These were the textbook based on the writings of pupils and the individual pupil lists.

The Spelling Textbook. The Pupils' Own Vocabulary Spellers were selected as the basic textbook because their purposes, methods, and word lists were in agreement with the purposes of this study. The words used in this series were based on the study, A Basic Vocabulary of Elementary School Children, by Henry D. Rinsland.[7]

The complete spelling word list from Grades II through VIII was used as an alphabetical reference list to which the children referred as the need arose.

The Individual Spelling Lists. The pupils were motivated to write freely in a variety of situations. An individual list of the words which each pupil misspelled was kept in a card file at his desk. Whenever a word was misspelled, it was checked with the list from the spelling series referred to above. If the word occurred in this list, it was added to the pupil's file for study. Local words of importance which the child desired to learn were also added to this individual list.

Other Basic Related Pupil Materials. Initial data indicated a need for vocabulary development. As spelling was emphasized at the level of reading, and because of the interrelationship of the language arts, extensive use was made by the pupils of the following materials:

1. Basic Readers: Curriculum Foundation Series.[8]
2. Building Word Power.[9]
3. Thorndike Century Beginning Dictionary.[10]

The Use of Tests and Measurements. The following sources of data for evaluation, diagnosis, and classification and grouping of pupils were used:

1. Temple University Informal Spelling Inventory.[11]
2. Teacher constructed informal spelling inventories using The Pupils' Own Vocabulary Spellers.[12]
3. Gates-Russell Spelling Diagnosis Tests.[13]
4. California Test of Mental Maturity.[14]
5. Progressive Achievement Tests.[15]

All these measurements were given at the beginning of the study, and the first two were repeated, using a different form, at the end of the experiment.

Procedures in Classroom Organization and Instruction. Artley has presented five principles applying to the improvement of spelling ability which have the weight of research behind them, and formed the basis for the classroom organizational and instructional procedures of this study. These are:

1. Each child develops at his own individual rate, and spelling instruction must be differentiated in terms of this rate of development.

2. A spelling vocabulary grows out of the need for expression rather than from a prepared spelling list.

3. Spelling, like any other subject in the curriculum, has to be taught.

4. Spelling has been effectively taught to the extent that the learner has been made independent in his spelling ability.

5. Spelling instruction is most effective when the child has a favorable attitude toward spelling --when he has the desire to spell acceptably.[16]

Needs Revealed by Initial Data. An early examination of data revealed that a wide range of ability existed among the pupils and that their spelling needs were highly individual. However, there was a commonness of needs among three groups within the grade. These were the accelerated who needed enriched and extended experiences in the semantics of words; the so-called average group who needed a maintenance and continuing program in spelling; and the general verbal and linguistic retarded group who needed a program of word study skills applicable to all the language arts. Cutting across groups were pupils who needed specific help in the visual, auditory, speech, kinesthetic, and handwriting skills. All needed an opportunity to write in meaningful situations, and each pupil needed an opportunity to succeed at his level of achievement. Briefly, a functional child development approach to spelling

was needed.

A functional approach to spelling required that opportunities be provided for writing in natural situations and that instruction be individualized. These conditions were provided for through the center of interest or functional activity unit in the content areas integrated with a unified language arts program.

The Functional Unit Program. The functional unit or center of interest program in the content areas was characterized by purposeful and satisfying pupil activities--group and individual, a balanced program of intensive and extensive reading, the development of language skills and abilities in social situations, a wise use of many aids to learning, the extension and enrichment of interests, and critical evaluation.

The Unified Language Arts Program. A unified language arts approach to spelling was made on the assumption that the child is integrated and that it is the purpose of the school to foster and maintain that integration. Test data indicated a wide range of language development among the pupils, ranging from the third grade through the eighth grade. This necessitated differentiation of instruction in terms of pupil achievement and needs.

Grouping of pupils was considered a part of an integrated language arts program. Three to four flexible groups were organized in terms of the instructional levels of the pupils. The instructional level of spelling was synchronized with the reading level.

One of the main procedures used for estimating achievement and needs in the group situations was the informal inventory in reading and spelling. These inventories were used for two main purposes. First, they provided a basis for grouping children in terms of their group needs, and second, they served as guides to the needs of the individuals in the group.

Other test data already discussed, and teacher judgment, were used to supplement the informal inventories in the grouping of pupils on levels of achievement. In general, there was little discrepancy among the various evaluation techniques.

Plan of Instruction in the Spelling Period. Daily provision was made for spelling instruction using the textbook and the individual lists. Briefly, the plan of instruction using the textbook was the study-test plan for the retarded pupils and the test-study plan for the others.

Since the pupils were grouped for spelling instruction at the instructional level, the usual daily plan found in spellers of what to do on particular days of the week was disregarded. The group simply proceeded as rapidly as possible in the time allotted, usually fifteen to twenty minutes a day. For example, on any day a group of words could be presented in contextual setting as a reading lesson, since spelling and reading groups were on similar levels, and the skill development exercises connected with those words completed on the same day rather than the following day as suggested by the text.

The learning of the words in the individual list was considered the responsibility of the individual pupils. Provision was made for individual and small group study, usually pairs of similar levels or pairs of different levels, depending upon the activity and pupil choice of partner.

Method of Studying a Word. The studies of Russell[17] and others showed that multiple and complex instructional steps were cumbersome and boring for good spellers and confusing and ineffective for poor spellers. The method employed in this study eliminated all the steps but the vitally useful ones. There were only three steps employed which varied slightly to meet the requirements of longer words. These steps were:

1. Look at the word and say it softly. If it has more than one part (syllable) say it again, part by part, looking at each part as you say it.
2. Look at the letters and say each one. If the word has more than one part, say the letters part by part.
3. Write the word without looking at your book.

This method centered on intense, uninterrupted study and analysis of the word. If the pupil wrote the word correctly the first time, that was an indication he knew it. However, he was asked to write it a second and a third time to "stamp in" the correct reaction before another word was taken up.

Words from the individual lists were studied in the same manner. The teacher checked with the individual pupils to determine if the proper concepts and common meanings of the words had been established.

Reviews. Research in spelling and child development indicated that periodic review on a long list of isolated words was a waste of time. Instead, it was commonly agreed that reviews become worthwhile when there is involved an opportunity for the child to make application of the generalizations, techniques, and principles being taught. It was the assumption in this study that in a classroom organized around functional units integrated with the language arts, and the use of a textbook series based on the Rinsland study,[18] natural reviews are experienced daily.

Reference has been made in this section to the various data used in evaluation and in classroom procedures. The following section presents a more detailed treatment and interpretation of data.

Presentation and Interpretation of Data

For comparative purposes, the data in the tables for January and June are presented together.

The Standardized Tests. Data from the stand-

ardized tests indicated two important facts. First, there was a wide range of ability among the pupils; and second, there existed a general verbal and linguistic retardation of one to three grades for a group of pupils at the lower distribution level. Furthermore, the intelligence quotients did not correspond with this retardation of the pupils. This confirms the findings of Spache that vocabulary knowledge is a more significant determinant of spelling success than is intelligence, particularly in the first five grades.[19]

The California Test of Mental Maturity, Short Form.[20] This test showed the average mental age of the pupils at the beginning of the study was 145 months with a range from 115 months to 186 months. The I.Q. ranged from 76 to 136.

The Progressive Achievement Test, Form AA.[21] This test gave the average grade placement for reading vocabulary as 5.5 with a range from 2.9 to 7.9; for reading comprehension, 6.6 with a range from 4.5 to 9.5; for language, 6.5 with a range from 5.3 to 7.2.

The Gates-Russell Spelling Diagnosis Tests.[22] An analysis of the types of errors along with other data, indicated symptoms of difficulty and some definite points where instruction should be given. However, in an attempt to go deeper into the difficulties and their causes, the Gates-Russell Spelling Diagnosis Tests were given to the lower group of pupils. Results of these tests showed a general verbal and linguistic retardation of one to three years for fifteen pupils. This evidence indicated a need for a general program of word skills which would apply to all the language arts, particularly reading and spelling, and opportunities for the use of words in meaningful situations.

Misspelled Words in Grades III to VI. To determine how well the children in the school as a whole spelled, their spelling errors in the spontaneous writings were analyzed in terms of all errors made by each grade group, all the errors in the group being pooled. Tables I and II present data on this type of analysis.

Misspelled Words at Each Grade Level. In writing 35,883 running words in Grades III - VI, the children misspelled 5.95 percent of them as shown in Table I. A comparison of these results with a similar study by Swenson and Caldwell shows that these children spelled better than the children of Prairie City.[23]

Also, the increase in the number of running words and the decrease in the number of spelling errors in successive grades Indicate growth in spelling and language abilities.

Misspelled Words for the Two Sixth Grades. Table III gives an interesting comparison of the two sixth grades of the school in that the percent of total errors is much higher for the "other" sixth grade than for the one described in this study. On the basis of standardized tests and previous teacher judgment, the two groups were comparatively equal in ability at the beginning of the school term. It has already been pointed out, however, that vocabulary knowledge is a more significant determinant of spelling ability than is intelligence, particularly in the first five grades.[24] Some other causative factors could be differences in classroom curriculum, methods, attitudes, motivation, and provisions for written expression.

With the misspelling of only 3.2 words per hundred in writing 5,896 words, it appears that the experimental group had reached a rather high level of achievement in spelling by the middle of the sixth grade. By comparison, this sixth grade in misspelling 3.2 percent of the total running words spelled much better than the Prairie City sixth graders who misspelled 5.8 percent of the total running words.[25]

Misspelled Words in the Experimental Group. In order to meet the spelling needs of children, it is necessary to know which words are misspelled most frequently in the writings of children. Tables III, IV, V, VI,VII and VIII are pertinent to this.

Different Errors and Repetitions. The proportion of different and repeated errors are summarized in two ways in Table III. In Columns 3 and 4 of Table III, the errors of different pupils are pooled into a grade summary. When a certain misspelling of a word was tabulated for the first time, that error was included in the 69.2 percent (different words misspelled). When, later, that same word was misspelled by the same child or another child, that same error was recorded among the 30.8 percent (repetition of errors). Thus, 69.2 percent of the spelling errors in January were different errors while 30.8 percent were repetitions of errors already included once each in the 69.2 percent. Likewise for June June, 66.2 percent of the spelling errors were different for the grade while 33.8 percent were repetitions of errors already included once each in the 66.2 percent.

Data concerning the proportion of different and repeated errors are summarized in terms of the errors of individual children in Columns 5 and 6 of Table III. That is, if a certain child misspelled a particular word once, it was counted among different words misspelled, even though other children in the same grade may have misspelled the same word. An error was counted a repetition of the same error in Column 6 only when the same child made the same error.

Data in Table III indicate two important facts concerning the proportion of different and repeated errors. First, most of the errors are different individual errors; and second, the errors repeated most frequently are of two sources, namely, errors repeated by different pupils, and individual repetitions of the same errors. A disproportionate share of the errors are repetitions of

TABLE I

PROPORTION OF MISSPELLED WORDS AT EACH GRADE LEVEL IN SPONTANEOUS WRITINGS OF PUPILS IN GRADES III-IV, JANUARY, 1951

Grade	No. of Pupils	Running Words	General Words, Including Proper Nouns		Unintelligible Words		Total Errors	
			No.	Percent	No.	Percent	No.	Percent
III	74	5,269	456	8.63	25	0.47	481	9.1
IV	100	7,617	559	7.38	17	.22	576	7.6
V	84	11,825	587	4.93	20	.17	606	5.1
VI	81	11,172	450	4.03	22	.19	472	4.22
III-VI	339	35,883	2,052	5.7	84	.23	2,135	5.95

TABLE II

PROPORTION OF MISSPELLED WORDS IN SPONTANEOUS WRITINGS OF THE TWO SIXTH GRADES IN JANUARY

Grade	No. of Pupils	Running Words	General Words, Including Proper Nouns		Unintelligible Words		Total Errors	
			No.	Percent	No.	Percent	No.	Percent
VI Other	40	5,277	268	5.08	14	.26	282	5.4
VI Exp.	41	5,895	182	3.08	8	.13	190	3.2

TABLE III

PERCENTS OF DIFFERENT AND OF REPEATED ERRORS IN SPONTANEOUS WRITINGS OF PUPILS FOR JANUARY AND JUNE

Date	Total No. of General Errors	Percentage for Grade Group		Percentage for Individual Pupils	
		Different Words Misspelled	Repetition of Errors	Different Words Misspelled	Repetition of Errors
January	182	69.2	30.8	80.0	20.0
June	234	66.2	33.8	77.0	23.0

TABLE IV

126 DIFFERENT WORDS MISSPELLED AND TOTAL ERRORS FOR JANUARY IN SPONTANEOUS WRITINGS OF PUPILS

No. of Misspellings per Word	Number of Different Words Misspelled		Total Errors	
	Frequency	Cumulative Frequency	Frequency	Cumulative Frequency
1	92	92 (73%)	92	92 (51%)
2	20	112 (90%)	40	132 (73%)
3	8	120 (95%)	24	156 (86%)
4	4	124 (98%)	16	172 (95%)
5	2	126 (100%)	10	182 (100%)

TABLE V

155 DIFFERENT WORDS MISSPELLED AND TOTAL ERRORS FOR JUNE IN SPONTANEOUS WRITINGS OF PUPILS

No. of Misspellings	Number of Different Words Misspelled		Total Errors	
	Frequency	Cumulative Frequency	Frequency	Cumulative Frequency
1	111	111 (72%)	111	111 (47%)
2	26	137 (88%)	52	163 (69%)
3	10	147 (95%)	30	193 (82%)
4	3	150 (97%)	12	205 (88%)
5	2	152 (98%)	10	215 (92%)
6	2	154 (99%)	12	227 (97%)
7	1	155 (100%)	7	234 (100%)

TABLE VI

126 DIFFERENT WORDS MISSPELLED IN CHILDREN'S SPONTANEOUS WRITINGS FOR JANUARY AND OCCURRENCES IN PUPILS' OWN VOCABULARY SPELLERS, FITZGERALD LIST, AND DOLCH LIST

Word	No. of Times Misspelled	Individual Repetitions	Pupils' Own Vocabulary Spellers Grade Placement	Fitzgerald List	Dolch List
left	5	3	2	F	D
reindeer	5	4	4	-	-
excitement	4	2	6	F	-
lawn	4	3	6	F	D
their	4	0	2	F	D
when	4	2	2	F	D
Christmas	3	1	2	F	D
fright	3	2	6	F*	-
friends	3	2	3	F	D*
judges	3	2	7	F*	D*
swimming	3	2	3	F	D
there	3	1	2	F	D
too	3	0	2	F	D
where	3	2	2	F	D
announcer	2	0	3*	F*	D*
airplanes	2	0	3*	F*	D*
again	2	0	2	F	D
beaver	2	1	5	-	-
brought	2	0	2	F	D
bears	2	1	2	F	D*
couldn't	2	1	3	F	D
didn't	2	0	3	F	D
decided	2	1	2	F	D
hitch	2	1	6	-	-
haven't	2	0	5	F	D
picnic	2	1	3	F	D
same	2	0	3	F	D
so	2	1	2	F	D
Saturday	2	1	3	F	D
stay	2	1	3	F	D
since	2	0	5	F	D
Santa	2	0	2	F	D
they're	2	0	5	F	D
wait	2	0	3	F	D
asylum	1	0	-	-	-
attention	1	0	5	F	-
a lot**	1	0	2	F	D
a time**	1	0	2	F	D
a half**	1	0	3	F	D
almost	1	0	3	F	D
built	1	0	4	F	D
before	1	0	2	F	D
better	1	0	2	F	D
barking	1	0	5	F*	D*

* Indicates derived form or base word in lists.
** Indicates combined word misspelling. Most difficult one used for grade placement.

TABLE VI (Continued)

126 DIFFERENT WORDS MISSPELLED IN CHILDREN'S SPONTANEOUS WRITINGS FOR JANUARY AND OCCURRENCES IN PUPILS' OWN VOCABULARY SPELLERS, FITZGERALD LIST, AND DOLCH LIST

Word	No. of times Misspelled	Individual Repetitions	Pupils' Own Vocabulary Spellers Grade Placement	Fitzgerald List	Dolch List
bed	1	0	2	F	D
berries	1	0	4	F	D
beat	1	0	4	F	D
completely	1	0	7	F*	-
close	1	0	3	F	D
chimney	1	0	3	F	D
caught	1	0	3	F	D
coming	1	0	2	F	D
corner	1	0	4	F	D
cheese	1	0	4	F	D
did not**	1	0	3	F	D
dangerous	1	0	4	F	D
daughter	1	0	4	F	-
dodge	1	0	-	-	D
description	1	0	7	F	-
Eve	1	0	-	-	-
fined	1	9	-	-	-
find	1	0	2	F	D
finally	1	0	4	F	D
for	1	0	2	F	D
fight	1	0	3	F	D
fighting	1	0	3*	F	D*
finish	1	0	4	F	D
floated	1	0	6*	F*	D*
forgetful	1	0	3*	F*	D*
growl	1	0	-	-	D
get	1	0	2	F	D
guide	1	0	7	F	D
heard	1	0	3	F	D
hurrying	1	0	4*	F*	D*
have to**	1	0	2	F	D
haven't	1	0	5	F	D
inner tube**	1	0	6	-	-
if	1	0	2	F	D
know	1	0	2	F	D
laid	1	0	4	F	D
minutes	1	0	4	F	D*
mad	1	0	3	F	D
must	1	0	3	F	D
merry	1	0	3	F	D
money	1	0	3	F	D
Martin	1	0	-	-	-
machine	1	0	3	F	-
months	1	0	3	F	D*
noise	1	0	3	F	D
no	1	0	2	F	D
offered	1	0	6	F	D*
overboard	1	0	8	-	-

* Indicates derived form or base word in lists

** Indicates combined word misspelling. Most difficult one used for grade placement.

TABLE VI (Continued)

126 DIFFERENT WORDS MISSPELLED IN CHILDREN'S SPONTANEOUS WRITINGS FOR JANUARY AND OCCURRENCES IN PUPILS' OWN VOCABULARY SPELLERS, FITZGERALD LIST, AND DOLCH LIST

Word	No. of times Misspelled	Individual Repetitions	Pupils' Own Vocabulary Spellers Grade Placement	Fitzgerald List	Dolch List
ouch	1	0	-	-	-
prison	1	0	6	F	D
porch	1	0	3	F	D
palm	1	0	-	-	D
picked	1	0	4	F	D*
road	1	0	3	F	D
rubbed	1	0	7	-	D*
repairing	1	0	8*	-	-
Rudolph	1	0	-	-	-
reindeer	1	0	4	-	-
rhyme	1	0	-	-	-
remembered	1	0	5	F	D*
second	1	0	2	F	D
scared	1	0	4	F	D*
spilt	1	0	-	-	-
scattered	1	0	7	-	D*
smeared	1	0	-	-	-
supper	1	0	3	F	D
sleigh	1	0	3	F	D
squad	1	0	-	-	-
then	1	0	2	F	D
through	1	0	3	F	D
tomorrow	1	0	3	F	D
tried	1	0	3	F	D
they	1	0	2	F	D
think	1	0	2	F	D
turned	1	0	3	F	D*
throw	1	0	3	F	D
tale	1	0	8	-	-
the	1	0	2	F	D
teeth	1	0	3	F	D
wondered	1	0	4	F	D*
where	1	0	4	F	D
weren't	1	0	5	F	D

* Indicates derived form of base word in lists.
Total different words misspelled--126 Total errors--182 Total individual repetitions--36
Total in Vocabulary Speller, Grades I-VI, 2,726 words, 102 (81%)
Total in Vocabulary Speller, Grades I-VIII, 4,067 words, 112 (90%)
Total in Fitzgerald List of 2,650 words, 101 (80%)
Total in Dolch List of 2,000 words, 96 (76%)

TABLE VII

155 DIFFERENT WORDS MISSPELLED IN CHILDREN'S SPONTANEOUS WRITINGS FOR JUNE AND OCCURRENCES IN PUPILS' OWN VOCABULARY SPELLERS, FITZGERALD LIST, AND DOLCH LIST

Word	No. of times Misspelled	Individual Repetitions	Pupils' Own Vocabulary Spellers Grade Placement	Fitzgerald List	Dolch List
father	7	5	2	F	D
piano	6	5	3	F	D
where	6	3	2	F	D
their	5	0	2	F	D
went	5	3	2	F	D
Blue Jay**	4	3	-	-	-
hold	4	3	3	F	D
there	4	3	2	F	D
experiences	3	1	5*	F*	-
from	3	1	2	F	D
happily	3	0	7	-	-
sheriff	3	2	-	-	-
squirrel	3	2	4	F	D
tried	3	1	3	F	D
thought	3	1	3	F	D
to	3	1	2	F	D
week end**	3	2	3	F	D
whales	3	2	7*	-	-
babies	2	1	3	F	D
baseball	2	0	3	F	D
boat	2	1	2	F	D
crawled	2	1	5	-	D*
eagle's	2	1	5*	-	-
every	2	0	2	F	D
for	2	0	2	F	D
fellowship	2	1	-	-	-
front	2	1	3	F	D
finally	2	0	4	F	D
his	2	0	2	F	D
loose	2	1	4	F	-
marshmallows	2	1	6	-	-
memorial	2	1	-	-	-
neighbor	2	1	6	F	D
planned	2	0	6	F	D*
rolls	2	1	3*	F*	D*
really	2	0	4	F	-
swimmer	2	1	4*	F*	D*
stopped	2	0	3*	F	D
too	2	0	2	F	D
truly	2	1	3	F	D
thought it	2	1	4	F	D
then	2	0	2	F	D

* Indicates derived form of base word in lists.
** Indicates combined word misspelling. Most difficult one used for grade placement.

TABLE VII (Continued)

155 DIFFERENT WORDS MISSPELLED IN CHILDREN'S SPONTANEOUS WRITINGS FOR JUNE AND OCCURRENCES IN PUPILS' OWN VOCABULARY SPELLERS, FITZGERALD LIST, AND DOLCH LIST

Word	No. of times Misspelled	Individual Repetitions	Pupils' Own Vocabulary Spellers Grade Placement	Fitzgerald List	Dolch List
upon	2	1	3	F	D
which	2	1	3	F	D
altogether	1	0	6	F	-
ankles	1	0	6*	F*	D
any others**	1	0	2	F	D
ate	1	0	2	F	D
ashore	1	0	7	-	-
armies	1	0	7	-	-
a boat**	1	0	2	F	D
bowl	1	0	4	F	D
brush	1	0	4	F	D
brought	1	0	2	F	D
couldn't	1	0	3	F	D
corral	1	0	8	-	-
curiosity	1	0	7	-	-
cooked	1	0	3	F	D*
captured	1	0	5	-	D*
coming	1	0	2	F	D
dived	1	0	7*	F*	-
dumb	1	0	-	-	-
dressed	1	0	3	F	D*
didn't	1	0	3	F	D
don't	1	0	2	F	D
divide	1	0	5	F	D
diamond	1	0	7	F	-
dead	1	0	4	F	D
disappointed	1	0	6	F	-
Epson	1	0	-	-	-
friend	1	0	2	F	D
fighting	1	0	3*	F	D*
first	1	0	2	F	D
grazing	1	0	7	-	-
gnaw	1	0	-	-	-
gotten	1	0	2*	F	D*
great	1	0	3	F	D
got	1	0	2	F	D
half	1	0	3	F	D
have	1	0	2	F	D
here's	1	0	2	F	D
happened	1	0	4	F	D*
height	1	0	7	F	-
howl	1	0	5	-	-
had	1	0	2	F	D
him	1	0	2	F	D
hundred	1	0	3	F	D
haunted	1	0	7	-	-
hopped	1	0	6*	F*	D*

*Indicates derived form of base word in lists.

TABLE VII (Continued)

155 DIFFERENT WORDS MISSPELLED IN CHILDREN'S SPONTANEOUS WRITINGS FOR JUNE AND OCCURRENCES IN PUPILS' OWN VOCABULARY SPELLERS, FITZGERALD LIST, AND DOLCH LIST

Word	No. of times Misspelled	Individual Repetitions	Pupils' Own Vocabulary Spellers Grade Placement	Fitzgerald List	Dolch List
inside	1	0	3	F	D
invaded	1	0	-	-	-
jitterbug	1	0	-	-	-
knew	1	0	3	F	D
kept	1	0	3	F	D
kidnapped	1	0	8	-	-
Knox	1	0	-	-	-
knob	1	0	8	-	-
know	1	0	2	F	D
language	1	0	4	F	D
listen	1	0	4	F	D
loaves	1	0	-	-	-
morning	1	0	2	F	D
myself	1	0	4	F	-
much	1	0	2	F	D
months	1	0	3*	F*	D*
million	1	0	5	F	D
moccasins	1	0	-	-	-
minutes	1	0	4	F	D*
magic	1	0	5	-	-
nice	1	0	2	F	D
Negroes	1	0	6*	F*	D*
noise	1	0	4	F	D
no	1	0	2	F	D
owned	1	0	5	F	D*
o'clock	1	0	3	F	D
off	1	0	2	F	D
open	1	0	3	F	D
potato	1	0	4	F	D
picked	1	0	4	F	D
rabbits	1	0	2*	F	D*
ribs	1	0	8*	-	-
rattlesnakes	1	0	7*	-	-
stayed	1	0	4	F	D
scared	1	0	4	F	D*
steps	1	0	4	F	D
she would**	1	0	2	F	D
showed	1	0	3	F	D*
surprised	1	0	4	F	D*
said	1	0	2	F	D
silver	1	0	4	F	D
stunned	1	0	-	-	-
spotted	1	0	4*	F*	D*
speeded	1	0	6*	F*	D*
stomach	1	0	5	F	D
swimming	1	0	3	F	D
them	1	0	2	F	D
think	1	0	2	F	D

*Indicates derived form of base word on lists.
** Indicates combined word misspelling. Most difficult one used for grade placement.

TABLE VII (Continued)

155 DIFFERENT WORDS MISSPELLED IN CHILDREN'S SPONTANEOUS WRITINGS FOR JUNE AND OCCURRENCES IN PUPILS' OWN VOCABULARY SPELLERS, FITZGERALD LIST, AND DOLCH LIST

Word	No. of times Misspelled	Individual Repetitions	Pupils' Own Vocabulary Spellers Grade Placement	Fitzgerald List	Dolch List
times	1	0	2	F	D
they	1	0	2	F	D
taffeta	1	0	-	-	-
toilet	1	0	-	-	-
talking	1	0	5	F	D*
until	1	0	3	F	D
unoccupied	1	0	-	-	-
uncle	1	0	3	F	D
village	1	0	4	F	D
writing	1	0	3	F	D
wiggled	1	0	-	-	-
walked	1	0	3	F	D*
wheels	1	0	4*	F	D*
wiener	1	0	8	-	-
while	1	0	3	F	D
worms	1	0	4*	F*	D*
yacht	1	0	-	-	-
zoom	1	0	-	-	-

* Indicates derived form of base word in lists.
Total different words misspelled--155 Total errors--234 Total Individual repetitions--53
Total in Vocabulary Spellers, Grades I-VI, 2,726 words, 121 (78%)
Total in Vocabulary Spellers, Grades I-VIII, 4,067 words, 137 (89%)
Total in Fitzgerald List of 2,650 words, 118 (77%)
Total in Dolch List of 2,000 words, 110 (71%)

TABLE VIII

GRADE PLACEMENT, NUMBER AND PERCENT IN PUPILS' OWN VOCABULARY SPELLERS OF DIFFERENT MISSPELLED WORDS IN SPONTANEOUS WRITINGS FOR JANUARY AND JUNE

	Grade 2	3	4	5	6	7	8	Not in Speller	Total
January	32(25%)	35(28%)	17(13%)	10(8%)	8(6%)	6(5%)	4(3%)	14(11%)	126
June	41(26%)	33(21%)	27(17%)	11(7%)	8(6%)	11(7%)	5(3%)	18(12%)	155

TABLE IX

PROPORTION OF MISSPELLED WORDS FOR SIXTH GRADE EXPERIMENTAL GROUP IN SPONTANEOUS WRITINGS IN JANUARY AND JUNE

Date	No. of Pupils	Running Words	General Words		Unintelligible Words		Total Errors	
			No.	%	No.	%	No.	%
January	41	5895	182	3.08	8	.13	190	3.2
June	41	7764	234	3.0	0	.00	234	3.0

TABLE X

DATA ON INFORMAL SPELLING INVENTORY SHOWING LEVELS OF ACHIEVEMENT AND MEANS FOR JANUARY AND JUNE

Date	Form	Number of Pupils at Different Grade Levels of Achievement. Grade:								Median Level	Mean Level
		1	2	3	4	5	6	7	8		
1-1-51	M	1	4	11	3	10	8	3	1	5	4.4
6-12-51	A	0	0	4	3	12	10	7	5	6	5.7

errors by individual children.

An interesting fact concerning the data for January and June is that the percents of different words misspelled for the grade group and for individual pupils are less in June than in January although 1,869 more words were written.

Frequency of Occurrence of Misspelled Words. Data in Tables IV and V offer specific information on the source of spelling errors. The first line of Table IV is read as follows: There were 92 different words which were misspelled only once in all the stories. These accounted for 73 percent of the 126 different words misspelled, but they comprised only 51 percent of the 182 total spelling errors. It is obvious that the few words represented at the bottom of Tables IV and V account for a disproportionately high percentage of the errors in the children's writing.

Tables VI and VII indicate the specific sources of these errors as repetitions of errors by different children, repetitions of errors by the same child, or a combination of both.

Different Words Misspelled. Different words misspelled, the number of times misspelled, individual repetitions, and occurrences in Pupils' Own Vocabulary Spelling Series,[26] A Basic Life Spelling Vocabulary,[27] and Dolch's 2,000 Commonest Words for Spelling,[28] are shown in Tables VI and VII, which are self-explanatory. How well each list met the needs of the pupils is given at the bottom of the tables in percents. If derived forms had been omitted, the percentages would have been somewhat less.

A further analysis of the total misspellings of these different words shows that in January 85% of the total errors occurred in words in the Pupil's Own Vocabulary Spellers, Grades I-VI, consisting of 2,726 words, and 92% occurred in words in the spelling series, Grades I-VIII of 4,067 words; that 82% occurred in words in the Fitzgerald List of 2,650 words; and that 79% occurred in words in the Dolch List of 2,000 Commonest Words.

Likewise for June, 80% of the total errors occurred in the Pupils' Own Vocabulary Spellers, Grades I-VI and 89% in the spelling series; that 78% occurred in the Fitzgerald List; and that 73% occurred in the Dolch List. These tables indicate that with the exception of unusual words, proper nouns, derived forms, and words of low frequency of usage, the writing needs of the pupils are adequately met for the most part in the lists.

These tables show that the words misspelled most frequently were either repetitions of errors by different children on "demon words", or repetitions of errors by the same child on a particular word.

Occurrence of Misspelled Words in Pupils' Own Vocabulary Spellers for January and June. An examination of Table VIII reveals two important facts, namely, that the spelling needs of the pupils cannot be met by a single spelling textbook, and that it cannot be assumed that the spelling words of the previous grades have been mastered by the pupils. For example, 74 percent of the different words misspelled in January are in a grade placement below the sixth grade, and 71 percent of the different words misspelled in June are in a grade placement below the sixth grade. Furthermore, 53 percent and 47 percent of the different misspelled words in January and June respectively, are placed in the second and third grades.

Proportion of Misspelled Words in January and June. Evidence on the effectiveness of the pupils' writings in January and June is given in Table IX. The reduction in pupil errors of .2 percent over the period of five months seems insignificant in itself. However, with the increased use of 1869 words and the probability of error among writings of sixth grade pupils with as wide a range of ability as this group had, it is doubtful if the percentage of errors could have been reduced much more in a five months period. By comparison again, the Prairie City sixth grade pupils made 2.8 percent more errors than did this sixth grade group. Also, this group would be equivalent to half-way between the seventh and eighth grade of the Prairie City school children.[29]

Informal Spelling Inventory Analysis. One of the best measurements of achievement for a particular group is the informal inventory because it evaluates the pupils on materials which they have had an opportunity to learn.

Temple University Informal Spelling Inventory.[30] Table X is self-explanatory. During the five months of the experiment, the pupils made a mean gain of 1.3 grades. The mean gain was actually higher because five pupils achieved beyond the eighth grade.

Teacher-Prepared Informal Inventory. The results of the teacher-prepared inventory as given in Table XI are similar to that of the one just described. It is not possible to give the mean because tests were not given beyond the sixth grade. Eight pupils scored beyond the sixth grade in January and fourteen pupils scored beyond the sixth grade in June. It is interesting to note, also, that in January fifteen pupils had an instructional level of second and third grade. In June this was reduced to four in number indicating much progress in the group which caused a majority of errors in the pupils' writings.

Summary and Conclusions

The purpose of this study was (a) to determine the spelling needs of the pupils of a sixth grade class through classroom experimentation and research, and (b) to suggest procedures for spelling instruction to meet those needs by utilizing the implications of scientific investigation and

TABLE XI

DATA ON TEACHER PREPARED INFORMAL SPELLING INVENTORY SHOWING LEVELS OF ACHIEVEMENT FOR JANUARY AND JUNE

Date	Number of Pupils at Different Grade Levels						
	1	2	3	4	5	6	Beyond
1-1-51	0	5	10	5	8	5	8
6-12-51	0	1	3	3	10	10	14

This presentation and interpretation of data is given for a particular school and a particular grade of that school. The evidence of this data may or may not be applicable to other classroom situations.

expert opinion.

To determine the spelling needs of those pupils, four main sources of data were used: 1) standardized tests, 2) informal inventories in spelling and reading, 3) analysis of spelling errors in pupils' spontaneous writings, and 4) the research and theory in spelling and related areas.

Initial analysis of the above data indicated that the spelling abilities of the children varied widely and that a core of approximately 2500 words made up about 95 percent of the words which the children used in writing. Moreover, there were three groups of pupils within the total group that had similar levels of achievement and needs. To meet the needs of the pupils within these groups, spelling instruction was integrated with language arts. To provide opportunities for using spelling in meaningful situations, instruction in the content areas was organized around the functional unit or experience approach.

Among the detailed findings of this study, the following points seem to be most significant:

1. Spelling instruction, to be most effective, must be differentiated in terms of the needs of the group and of the individuals within the group.

2. Vocabulary knowledge is a more significant determinant of spelling success than is intelligence, particularly in the elementary grades.

3. A general verbal and linguistic retardation is a major cause of poor spelling.

4. Most of the spelling errors which sixth grade children make in spontaneous writing are individual errors.

5. The spelling errors repeated most frequently are either errors repeated by different pupils, or individual repetitions by the same individual pupil.

6. The words needed for sixth grade children's spontaneous writing can be met, for the most part, by a reliable core list supplemented by individual word lists checked for frequency of occurrence with a valid list.

7. The use of a single textbook for all the children in a class does not meet the needs of the pupils.

8. It cannot be assumed that mastery of spelling words and word attack skills has been achieved and maintained in previous grades.

9. The informal inventories in spelling and reading are effective aids in grouping of pupils on levels of ability.

10. Spelling ability is one of a constellation of language arts abilities that tend to reinforce each other.

11. The study-test plan of instruction is an effective procedure in instructing retarded or slow-learning pupils, and the test-study plan is an effective procedure for the accelerated pupils.

12. An analysis of children's spontaneous writings is an effective means for determining pupils' spelling needs.

13. Many pupils of the sixth grade have not developed an effective method of studying a word.

14. Incidental learning should be supplemented by direct systematic teaching, especially in the case of difficult words and words of high frequency of occurrence.

15. Children, working on levels of achievement and using spelling in meaningful situations, tend to have favorable attitudes toward spelling.

16. Adequate research, for all practical purposes, appears to be available for improved spelling instruction.

The final conclusion of the writer is that while the functional method was not necessarily better for all pupils, it was better than the conventional method for many pupils in the class. The functional method of teaching spelling in a curriculum organized as described in this study was reasonably effective in meeting the needs of the pupils. Individual differences provide opportunities for rich living. In a democratic society, these differences are regarded as assets.

FOOTNOTES

1. James A. Fitzgerald, The Teaching of Spelling (Milwaukee: The Bruce Publishing Company, 1951), p. 2.
2. California Test of Mental Maturity (Los Angeles: California Test Bureau, 1950).
3. Progressive Achievement Tests--Elementary Battery (Los Angeles: California Test Bureau, 1950).
4. Arthur I. Gates, Henry D. Rinsland, Ina C. Sartorius, and Celeste C. Pearson, The Pupils' Own Vocabulary Speller, revised edition (New York: The Macmillan Company, 1950).
5. James A. Fitzgerald, A Basic Life Spelling Vocabulary (Milwaukee; The Bruce Publishing Company, 1951).
6. Edward W. Dolch, Better Spelling (Champaign, Ill.: The Garrard Press, 1942), pp. 257-270.
7. Henry D. Rinsland, A Basic Vocabulary of Elementary School Children (New York: Macmillan Company, 1945), 636 pp.
8. William S. Gray, Basic Readers: Curriculum Foundation Series (New York, Scott Foresman Company, 1950).
9. Donald Durrell, Helen Sullivan and Helen Murphy, Building Word Power (New York: World Book Company, 1945).
10. Thorndike Century Beginning Dictionary (New York: Scott Foresman Company, 1945).
11. Temple University Informal Spelling Inventory (Reading Analysis of the Reading Clinic, Temple University, Philadelphia.
12. Gates, et al., op. cit.
13. Gates-Russell Diagnostic Spelling Tests (New York: Bureau of Publications, Teach-

ers College, Columbia University, 1937).
14. California Test of Mental Maturity, loc. cit.
15. Progressive Achievement Tests, loc. cit.
16. A. Sterl Artley, "Principles Applying to the Improvement of Spelling Ability," Elementary School Journal, 49: 137, November, 1948, pp. 137-148.
17. David H. Russell, Characteristics of Good and Poor Spellers; A Diagnostic Study, Teachers College Contribution to Education, No. 272. (New York: Bureau of Publications, Teachers College, Columbia University, 1937).
18. Rinsland, loc. cit.
19. George Spache, "Spelling Disability," Journal of Educational Research, 34: 561-586, April, 1941.
20. Loc. cit.
21. Loc. cit.
22. Loc. cit.
23. Ester J. Swenson and Charles G. Caldwell, "Spelling in Children's Letters," Elementary School Journal, 49: 224-235, December, 1948.
24. Spache, loc. cit.
25. Swenson and Caldwell, op. cit.
26. Gates, et al., loc. cit.
27. Fitzgerald, loc. cit.
28. Dolch, loc. cit.
29. Swenson and Caldwell, op. cit.
30. Loc. cit.

BIBLIOGRAPHY

Betts, Emmett A., Foundations of Reading Instruction (New York: American Book Company, 1946).

Betts, Emmett A., "Inter-relationship of Reading and Spelling," Elementary English Review, 22:13, January, 1945.

Brittain, Francis J., and Fitzgerald, James A., "The Vocabulary and Spelling Errors of Second Grade Children's Themes," Elementary English Review, 19:43-50, February, 1942.

California Test of Mental Maturity, (Los Angeles: California Test Bureau).

Dolch, Edward W., Better Spelling (Champaign, Illinois: The Garrard Press, 1942), 270 pp.

Durrell, Donald D.; Sullivan, Helen Blair, and Murphy, Helen A., Building Word Power, (New York: World Book Company, 1945), 102 pp.

Durrell, Donald D., Improvement of Basic Reading Abilities, (New York: World Book Company, 1940), 407 pp.

Fitzgerald, James A., A Basic Life Spelling Vocabulary, (Milwaukee: The Bruce Publishing Company, 1951), 161 pp.

Fitzgerald, James A., The Teaching of Spelling, (Milwaukee: The Bruce Publishing Company, 1951) 233 pp.

Fox, Williams H., and Eaton, Merrill T., Analysis of Spelling Proficiency of 82,833 Pupils in Grades 2 to 8 in 3,547 Teaching Units of the City Schools of Indiana, Bulletin of the School of Education, Indiana University, Vol. XXII, No. 2 (Bloomington: Bureau of Cooperative Research and Field Service, Indiana University, 1946).

Fox, William H., Spelling Proficiency in Township Schools in Indiana, Bulletin of the School of Education, Indiana University, Vol. 23, No. 1, (Bloomington: Division of Research and Field Services, Indiana University, 1947).

Gates, Arthur I.; Rinsland, Henry D.; Sartorious, Ina C.; and Peardon, Celeste C., The Pupils' Own Vocabulary Speller, revised edition, (New York: The Macmillan Company, 1950).

Gates, Arthur I., Spelling Difficulties in 3,876 Words, (New York: Bureau of Publications, Teachers College, Columbia University, 1937), 166 pp.

Gates-Russell Diagnostic Spelling Tests (New York: Bureau of Publications, Teachers College, Columbia University, 1937).

Gray, William S., Basic Readers: Curriculum Foundation Series, (New York: Scott, Foresman Company, 1950).

Gray, William S., Developing Word Attack Skills, (New York: Scott, Foresman Company, 1947.

Gray, William S., On Their Own in Reading, (New York: Scott, Foresman Company, 1948) 268 pp.

Gray, William S., et al., The Guidebook for Basic Readers: Curriculum Foundation Series, (New York: Scott, Foresman Company, 1950).

Hildreth, Gertrude, "New Light on the Spelling Problem," Elementary English, 25:201-207, April, 1948.

Horn, Ernest, "Spelling," Encyclopedia of Educational Research, revised edition, 1950, pp. 1247-1264.

Lee, J. Murray, and Lee, Doris May, The Child and His Curriculum, (New York: Appleton-Century-Crofts Inc., 1950), 710 pp.

McKee, Paul, Language in the Elementary School, revised edition, (Boston: Houghton Mifflin Company, 1939), pp. 329-440.

Progressive Achievement Tests-Elementary Battery, (Los Angeles: California Test Bureau, 1950).

Rinsland, Henry D., A Basic Vocabulary of Elementary School Children, (New York: Macmillan Co., 1945), 636 pp.

Russell, David H., Characteristics of Good and Poor Spellers, Teachers College Contribution to Education, No. 727 (New York: Bureau of Publications, Teachers College,

Columbia University, 1937), 103 pp.

Spache, George, "Spelling Disability," Journal of Educational Research, 34:561-586, April, 1941.

Sterl, Artley A., "Principles Applying to the Improvement of Spelling Ability," Elementary School Journal, 49:137-148, November, 1948.

Swenson, Estes J., and Caldwell, Charles G., "Spelling in Children's Letters," Elementary School Journal, 49:224-235, December, 1948.

Wilson, Louis Ada, "Children's Spelling Needs and Their Implications for Classroom Procedures," Elementary School Journal, 47: 98-102, October, 1946.

JOURNAL OF EXPERIMENTAL EDUCATION
(Volume 29, Number 1, September 1960)

PUBLIC ATTITUDES TOWARD EDUCATION

DONALD B. BLACK et al.*
University of Alberta

THE SEVERE criticism to which our educational system has been subjected recently has resulted directly in the establishment of a number of public investigating groups to examine educational matters. In Canada, these groups are established as Royal Commissions in the particular provinces concerned. At present, three are sitting or have just concluded sittings in four of the western provinces. While many educators view such investigations as indicative of renewed public interest in their schools, it is the purpose of this study to attempt to establish the degree of this interest by determining the extent to which a small segment of the Alberta population is aware of the existence of the Alberta Royal Commission on Education and some of this sample's attitudes towards the provincial educational system in general.

Method

On August 5, 1958, between 7 and 9 p. m., forty-four interviewers telephoned 831 private homes in the Edmonton area. The numbers called were chosen at random from the numbers listed in the back of the Edmonton Telephone Directory and were checked in the directory proper to ensure that each number was for a residence telephone. Of the 831 calls made, 225 residents did not answer or their lines were busy. These numbers were called a second time after a half-hour interval. Forty-four of those answering were not eligible for inclusion in the survey because they were under the age of eighteen, resident outside the province, or unable to speak English. Fourteen interviews were not completed because of such interruptions as the respondents answering the door, feeding the baby, or visitors arriving. These cases were excluded from the sample. Sixty-nine respondents refused to be interviewed, some because they thought the call was a device to sell magazines, encyclopedias, insurance, correspondence courses, vacuum cleaners, or to solicit religious contributions. Others said that they could not be bothered. It should be noted here, that the use of the psuedo-telephone survey as a sales promotional device constitutes a serious threat to the validity of studies made by legitimate research groups. Even among the interviews completed, the prevalence of the "What's your gimmick?" attitude at the end of the interview was marked. On the whole, however, the interviewers reported excellent cooperation from the 158 men and 321 women who answered the interviewer's questions. In every instance, the anonymity of the respondent was protected.

The calls took the form of a structured interview in which answers to specific questions were sought. The interview had three sections: data about the respondent, such as age, formal education, children attending school, presence of newspapers, radio, and television in the home; questions about the Alberta Royal Commission on Education; and last, questions about the Provincial educational program in general. The responses were recorded on a specially prepared data sheet which also served as the interview outline. Notwithstanding the presence of the form before them, some of the interviewers on occasion neglected to ask some of the questions and this was duly recorded.

Analysis of Data

The recorded replies on interview forms were classified and coded for punching into IBM cards. Subsequent analysis of the data was done on the IBM type 101 Electronic Statistical Machine.

It was a hypothesis of this study that there are three factors that would influence responses to the various questions asked. The first of these is called "parental status." The 479 respondents were divided into five categories based on information given in the interview. These five categories are: 1) single, 2) married with no children (N. C), 3) married but with pre-school age children only (P. S. O.), 4) married with children attending school in grades one through university or undergoing professional training, such as, nursing (C. A. S.), and 5) married respondents whose chil-

*This study reports a project conducted by the students in the Methods of Educational Research class during the 1958 Summer School at the University of Alberta.

dren had left school (C. G. U.).

The second broad categorization dealt with the amount of formal education the respondent had received. Six categories were employed: 1) elementary, grades 1-8 (ELEM); 2) high school, grades 9-12 (H. S.); 3) university and/or professional training beyond high school, such as nursing (UNIV.); 4) technical or commercial training beyond high school (TECH.); 5) a group consisting primarily of European-born respondents whose equivalent educational level was not known (OTHERS), and finally, 6) a group who did not state or were not asked the level of their formal schooling by the interviewer (NO. ST.).

The third area of interest was the age of the respondents. The interviewer in the conversation asked the respondent into which of five age groups his or her age fell. For six who would not divulge their age, a not-stated category (Not Stated) was added.

The first analysis sought to establish the access of the respondent to educational information and specifically, information about the Alberta Royal Commission on Education. This dealt with such items as regular receiving of a newspaper, radio and television in the home, and membership in Home and School Associations.

Of the 479 respondents, 455 received the one local daily newspaper regularly while only eighteen received no paper. The remainder received an out-of-town English language paper only or a foreign language paper only. Four hundred and eighteen listened predominantly to one of the five local English-speaking radio stations while only four listened predominantly to the one local French station. Only six of the respondents indicated they had no radio, whereas forty-five did not state a preference or listened predominantly to foreign stations via short wave. Responses for six persons were not recorded. Concerning television, 382 had access to sets; ninety-two did not. Four responses were not noted.

The relationship between Home and School Association membership and parental status is reported in Table I. This table would suggest that in terms of membership in the Home and School Associations, slightly less than half the parents (47%) with at least one child attending school are members, whereas eleven percent of this group had belonged at one time.

It must be noted at this point that the press and radio coverage of the Alberta Royal Commission on Education has been acknowledged openly by the Commission members to be both extensive and impartial in their presentation of the briefs placed before this Commission.

It can be concluded from the above that the vast majority of the sampled population have had ready access in some form to information about the Commission and its activities and other educational matters inasmuch as this information is given by the local press and radio-television media. On the other hand, information about the provincial and local educational policy of a detailed and specific nature that one would expect to be normally made available through organizations interested directly in education and represented in this study by membership in a home and school association, has been made available to only one-third of the sampled population.

The first group of questions asked by the interviewers dealt with the Alberta Royal Commission on Education (the Cameron Commission). The opening question sought to establish awareness of the existence of the Commission. If respondents did not recognize it at first, the interviewer gave certain additional information about the Commission and any delayed recognition was recorded. These data are reported in Table II. Approximately half the respondents in the sample indicated that they had heard of the Cameron Commission but almost an equal number had not. Twenty-six recognized it after additional information was given. Clearly, the group with a university or professional formal education were, as a single group, most aware of the existence of the Commission, whereas the respondents with an elementary education were least aware of it. For the remainder of the categories, the proportion of "awares" to "not awares" was about half.

It was appreciated, however, that the mere recognition of the Royal Commission on Education was not sufficient to indicate knowledge of the Commission's activities. Those who had heard of the Commission were also asked, "What is this Commission trying to do?" The responses to this question classified by degree of correctness of answers are reported in Table III.

It is evident from this table that although 230 recognized the Cameron Commission, only slightly more than half of this group had any knowledge of the objectives of the Commission. Again, it is evident that no marked differences exist between the portions of responses of the sampled group categorized by parental status and age, but that the formal education of the respondent does bear an important relationship to knowledge of the Commission. It would appear that the degree of knowledge about the Commission varies directly with the amount of formal education. Of the group with a university or professional education, only a quarter admitting recognition of the Commission had no knowledge of it. For the remainder of the categories, this proportion was about half, with the exception of the group with only an elementary formal education. Three-quarters of this particular group who claimed knowledge of the Commission did not know what it was trying to do.

The respondents who recognized the Royal Commission either on presentation of its title or after receiving partial information about it, were asked what they remembered hearing about the

TABLE I

RELATIONSHIP OF MEMBERSHIP IN A HOME AND SCHOOL ASSOCIATION TO PARENTAL STATUS (N =479)

Parental Status	Membership in a Home and School Association				
	Never Belonged	Currently Belong	Had Belonged	Response Not Indicated	Total
Single	48	--	1	29	78
Married:					
No Children	53	6	7	8	74
Children grown up	50	1	6	9	66
Preschool children only	50	2	4	10	66
Children attending school	76	91	21	7	195
Total	277	100	39	63	479

TABLE II

RELATIONSHIPS OF AGE, PARENTAL STATUS, AND EDUCATION TO STATED AWARENESS OF THE EXISTENCE OF THE ALBERTA ROYAL COMMISSION ON EDUCATION (N = 479)

Have you heard of the Alberta Royal Commission on Education or the Cameron Commission as it is often called?	Parental Status					Formal Education						Age of Respondent					
		Married															
Response Category	Single	N. C.	C. G. U.	P. S. O.	C. A. S.	ELEM.	H. S.	UNIV.	TECH.	OTHER	NO. ST.	Under 21	21-34	35-50	Over 50	Not Stated	Total
Yes	31	34	35	31	99	27	139	45	16	2	1	13	81	98	36	2	230
No	37	36	28	33	86	88	107	7	9	5	4	14	88	77	37	4	220
Yes, after clues given	9	3	3	2	9	4	11	8	2	1	--	3	7	10	6	--	26
Response Not Recorded	1	1	--	--	1	--	2	--	--	--	1	1	1	1	--	--	3
Total	78	74	66	66	195	119	259	60	27	8	6	31	177	186	79	6	479

TABLE III

RELATIONSHIPS OF AGE, PARENTAL STATUS, AND EDUCATION TO KNOWLEDGE OF ALBERTA ROYAL COMMISSION ON EDUCATION OF THOSE EXPRESSING INITIAL AWARENESS OF COMMISSION'S EXISTENCE (N = 230)

What is this Commission trying to do?		Parental Status				Formal Education						Age of Respondent					
		Married															
Response Category	Single	N.C.	C.G.U.	P.S.O.	C.A.S.	ELEM.	H.S.	UNIV.	TECH.	OTHER	NO. ST.	Under 21	21-34	35-50	Over 50	Not Stated	Total
Meaningless replies	3	3	2	2	8	4	12	1	1	--	--	1	5	9	2	1	18
No Opinion (I don't know)	11	10	14	7	24	12	44	4	4	1	1	7	25	21	13	--	66
Confused or Mistaken Identity	--	2	--	3	5	2	7	--	1	--	--	--	4	4	2	--	10
Some Knowledge (Confused Concept of Authority)	10	14	9	9	35	7	43	20	6	1	--	2	28	37	9	1	77
Thorough Knowledge	3	4	7	8	23	--	24	19	2	--	--	2	13	22	8	--	45
Response Not Indicated	4	1	3	2	4	2	9	1	2	--	--	1	6	5	2	--	14
Total	31	34	35	31	99	27	139	45	16	2	1	13	81	98	36	2	230

Cameron Commission. Categorization was done in terms of the content of their replies in relation to education and the Commission itself. Negative remarks about the Commission included such comments as "a bunch of eggheads wasting the taxpayer's money." Positive statements were represented by remarks such as, "this is a good thing and long over due." Positive and negative remarks about education materialized in such comments as "seeing what a good job the schools are doing," to "finding out how poor our schools really are." Comments relating to Commission personnel referred to specific members of the Commission or events involving specific members of the Commission. Incorrect information here, as in the previous table, dealt with those who mistook the identity of the Commission concerned, confusing it with such groups as the Liquor Commission. These data are presented in Table IV.

This table confirms the findings of Table II in that half of the respondents could not recall hearing anything about the Cameron Commission. Most frequent responses indicated a favorable attitude to the Commission and a negative attitude to education. Positive statements are not far behind in frequency. In Table IV, no clear relationship between categorization of respondents and response is evident other than that reported earlier concerning amount of formal education.

The last question asked, in regard to the Royal Commission, was "What is your frank opinion of its possible influence on Alberta education?" This was an attempt to identify the extent of the confidence in the Commission's capacity for diagnosis of, and prescription for the province's educational ills, as well as the government's acceptance of the Commission's findings. Again, the responses were categorized according to the nature of the response. With one exception, the categories are self-descriptive. The Qualified Optimism consists of those commenting that "the Commission will do a lot of good if the findings are followed up." These data are reported in Table V.

Table V shows that those expressing optimism about the value of the Royal Commission on Education outnumber those who have no opinion in this regard and far outweigh the number of those expressing pessimism. Again, respondents with university or professional education give a much higher proportion of positive opinions which are predominantly optimistic. By contrast, the bulk of the group with only elementary schooling have no stated opinions. Only one other group, married respondents with children of school age, share the same willingness to commit themselves to an opinion. On the other hand, the single group in the Parental Status category and the "under 21" group of the "Age" analysis, who obviously represent a marked overlap in categorization, showed an unwillingness to make any commitment regarding the possible value (or lack of it) of the Royal Commission on Education.

In summary, the effect of widespread reporting of the Royal Commission on Education activities has not resulted, for the sample surveyed at least, in any marked awareness of the Commission and its activities. Perhaps this reflects a general lack of interest in schools by the general public. The only factor that does seem related to interest in the Commission is the amount of formal education received by the respondent. University and professionally trained respondents are far more cognizant of the Commission's existence, aims, and objectives, and are more optimistic of its potential value than are any other group. On the other hand, the group with a formal schooling terminated at the elementary level showed a general unawareness of and lack of concern for the activities of the Commission. Surprisingly, the categorization by "parental status" of married respondents with and without children enrolled or about to be enrolled in school produced, in most instances, few differences of the magnitude reported for amount of formal education categorization of respondents. The same results were noted for the categorization by age of respondent.

The second part of the study sought to establish the attitudes of the sample surveyed towards the Provincial educational program in general. The respondents were asked first to give one feature of the educational system they thought was weakest; next, what they thought was good about the educational system; and finally, they were asked to make one suggestion that would in their opinion improve the caliber of our schools regardless of how good or bad they rated the schools.

Obviously, there was a wide variety of replies to such leading questions. Consequently, in the development of categories, it must be emphasized that these may include both positive and negative aspects, particularly in answer to the question on improving the schools. For example, in the homework category, some respondents thought that there should be more homework whereas others thought there was already too much and this should be reduced. This study attempted only to identify areas of response of the sample to the questions, not to measure the magnitude or direction of these responses.

In reply to the question asking what the respondent thought weakest about our schools, twelve categories resulted, including one for respondents who did not reply or to whom the question was not asked by the interviewer. These data are presented in Table VI.

It can be seen from this table that about a quarter of the sample had no opinions about what they felt wrong with the schools. Twenty-four, or five percent of the respondents stated they had no criticism of the schools. Dissatisfaction with the

TABLE IV

RELATIONSHIP OF AGE, PARENTAL STATUS, AND EDUCATION TO RECALL OF INFORMATION ABOUT ALBERTA ROYAL COMMISSION ON EDUCATION OF RESPONDENTS INDICATING AWARENESS OF ITS EXISTENCE (N = 256)

Have you heard of the Alberta Royal Commission on Education or the Cameron Commission as it is sometimes called?	Parental Status					Formal Education						Age of Respondents					
		Married															
Response Category	Single	N.C.	C.G.U.	P.S.O.	C.A.S.	ELEM.	H.S.	UNIV.	TECH.	OTHER	No. ST.	Under 21	21-34	35-50	Over 50	Not Stated	Total
Nothing	15	5	11	7	24	10	44	3	4	--	1	8	21	24	9	--	62
Can't recall just now	10	13	6	5	25	13	33	9	2	2	--	3	19	27	9	1	59
Negative to Commission	--	3	--	--	4	--	5	1	1	--	--	--	3	3	1	--	7
Positive to Commission	3	3	7	5	19	2	16	15	4	--	--	--	11	18	8	--	37
Negative to Education	4	5	3	2	14	--	17	10	1	--	--	3	8	12	4	1	28
Positive to Education	2	3	2	6	10	2	12	8	1	--	--	1	11	9	2	--	23
Commission Personnel	1	--	2	2	2	1	4	1	1	--	--	1	1	3	2	--	7
Incorrect Information	4	1	2	3	3	--	6	3	4	--	--	--	7	5	1	--	13
Response not indicated	1	4	5	3	7	3	13	3	--	1	--	--	7	7	6	--	20
Total	40	37	38	33	108	31	150	53	18	3	1	16	88	108	42	2	256

TABLE V

RELATIONSHIP OF PARENTAL STATUS, EDUCATION, AND AGE TO CONFIDENCE IN VALUE OF ALBERTA ROYAL COMMISSION OF RESPONDENTS INDICATING AWARENESS OF IT'S EXISTENCE (N =256)

What is your frank opinion of it's (Royal Commission's) possible influence on Alberta Education?	Parental Status					Formal Education						Age of Respondents					
		Married															
Response Category	Single	N. C.	C. G. U.	P. S. O.	C. A. S.	ELEM.	H. S.	UNIV.	TECH.	OTHER	NO. ST.	Under 21	21-34	35-50	Over 50	Not Stated	Total
Don't know	18	13	15	3	31	14	52	6	8	2	--	9	29	28	16	--	82
Extremely Optimistic	3	3	2	3	6	1	10	6	--	--	--	1	5	8	3	--	17
Optimistic	7	11	10	15	43	7	48	25	6	--	--	3	28	40	14	1	86
Pessimistic	2	6	4	1	8	1	11	7	1	1	--	--	6	12	2	1	21
Emphatically Pessimistic	3	--	3	1	3	1	6	2	1	--	--	2	2	3	3	--	10
Qualified Optimism (Proviso)	5	2	1	4	10	3	11	6	2	--	--	--	10	10	2	--	22
Neutral (Won't do any harm)	--	--	--	--	4	--	3	1	--	--	--	--	2	2	--	--	4
Response not indicated	2	2	3	4	3	4	9	--	--	--	1	1	6	5	2	--	14
Total	40	37	38	33	108	31	150	53	18	3	1	16	88	108	42	2	258

TABLE VI

RESPONSES CATEGORIZED BY PARENTAL STATUS, FORMAL EDUCATION, AND AGE OF RESPONDENTS WHEN ASKED TO INDICATE ONE WEAK FEATURE OF ALBERTA'S EDUCATIONAL PROGRAM (N = 479)

If you had to state one feature of our schools that is weakest, what would this be?	Parental Status					Formal Education						Age of Respondents					Total
		Married															
Response Category	Single	N. C.	C. G. U.	P. S. O.	C. A. S.	ELEM.	H. S.	UNIV.	TECH.	OTHER	NO. ST.	Under 21	21-34	35-50	Over 50	Not Stated	
Don't know, or couldn't say	24	18	16	25	39	43	64	5	5	2	3	8	48	41	22	3	122
No criticism of schools	6	4	4	2	8	9	13	1	--	--	1	2	12	5	4	1	24
Dissatisfaction over curriculum	14	12	11	11	37	10	49	15	10	1	--	6	31	36	12	--	85
Dissatisfaction over teaching methods	6	13	4	4	27	7	34	10	3	--	--	4	18	24	7	1	54
Division of home and school responsibilities	1	3	1	1	1	1	4	1	--	--	1	--	4	1	2	--	7
Extra-curricular activities	2	2	3	1	6	6	4	2	2	--	--	--	5	7	2	--	14
Standard of achievement	9	4	8	6	13	9	18	8	2	3	--	1	15	13	11	--	40
Standard of teacher qualifications	2	3	2	3	10	2	15	3	--	--	--	3	9	7	1	--	20
Crowded conditions	--	--	--	1	6	2	4	1	--	--	--	--	2	5	--	--	7
Lack of discipline	9	11	11	7	35	22	39	8	3	--	--	4	21	32	14	1	72
Miscellaneous replies	5	4	5	5	10	5	15	5	2	2	--	3	10	12	4	--	29
Response not indicated	1	--	1	--	3	3	--	1	--	--	1	--	2	3	--	--	5
Total	78	74	66	66	195	119	259	60	27	8	6	31	177	186	79	6	479

present curriculum was the most common complaint. Lack of discipline in the schools ranked second. Standards of achievement seemed more important to the respondents since standards received twice as many responses as did concern for teacher qualifications. However, less than ten and five percent of the sample indicated standards of achievement or teacher qualifications, respectively, as primary concerns. By contrast, the division of home-school responsibilities which included religious training and complaints about crowded conditions were noted only by seven respondents in each case from the total sample of 479.

The major relationship evident in Table VI lies between the amount of formal education and response. It is clearly evident here that the amount of education does relate directly to the willingness or ability to respond. It is to be noted that respondents with an elementary education place far more stress on the lack of discipline than do those with university or professional training, while this latter group shows greater concern for the curriculum and teaching methods.

The responses to the item which asked the respondents to state one feature they thought was good about the schools is presented in Table VII.

The results of the "one good feature" item indicated that almost three-eighths of the sample could not state one feature they thought was good about the schools. Moreover, an additional eighteen felt they could say nothing good about Alberta's educational program, whereas eighty-seven or over eighteen percent of the respondents felt the schools were doing an "all-round good job." Apart from such general responses, forty-six persons found occasion to make comments about teachers and teaching methods as good features of the present schools. On the other hand, school extra-curricular activities and the schools' provision for individual differences found mention by the least number of respondents. As noted earlier, the nature of the response bears closer relationship to the amount of formal education of the respondent than either parental status or age of the respondent.

Mark Twain once remarked that "Everybody talks about the weather but nobody does anything about it." The last question gave respondents opportunity to make one suggestion that would in their opinion improve the present educational system. It was here more than in either of the previous questions that the categorization used is meaningless in regard to the positive or negative aspect of the response. However, when the number of responses warranted, an attempt was made to differentiate between positive and negative responses within a single category. In all, thirteen categories resulted, including one for responses not reported. While the majority are self-descriptive, two need further clarification. The "Administrative Arrangements" category includes scholarships, financial equalization, and uniformity of curriculum from province to province and from school to school. The category on Moral Attitudes and Values includes responses that indicate the need for religious training, the desirability of fighting communism, the importance of teaching respect for elders, and like responses. It should be noted that unlike the previous two sets of answers, all responses were able to "fit" into the created categories without recourse to a miscellaneous category. These data are presented in Table VIII.

The number of respondents who didn't know, couldn't say, or were so satisfied with the schools that they would suggest nothing, accounted for over a third of the sampled population. Improvement of teacher qualifications and teaching methods was cited most frequently as the one way to improve our schools, with teaching Moral Attitudes and Values least frequently mentioned. As in previous analyses in this study, the amount of formal education seems to bear the greatest relationship to response than either parental status and age.

Limitations of the Study

No attempt has been made to analyse the reported data exhaustively for relationships other than those that are readily evident. The responses of the interviewees have been assumed to be valid expressions of their opinions and have been correctly recorded by the interviewers. The sampling technique obviously limits the surveyed population to those who possess telephones with listed numbers, and significantly more women than men answered the telephone at the time of night the calls were placed. Concern is expressed for dwellers in newly developed areas of the city which are presently served poorly by telephones. Many of these areas are populated predominantly by young families with pre-school and school-age children. It is believed that socio-economic status bears little direct relationship to possession of a telephone except for the extreme low end of the scale. Moreover, if we assume that the majority of respondents have lived in the Edmonton area or even in Alberta for any length of time, their opinions about Alberta education will be based predominantly on the public, separate and private schools of the Edmonton area. Obviously, the same survey made in an area other than the one used in this study might produce a different configuration of results. The readily-documented superior qualifications of city teachers as a group compared with those of teachers in rural areas is an example of one factor that might produce a different pattern of responses for another area. Notwithstanding the above limitations, the data should still be significant inasmuch as a large proportion of

TABLE VII

RESPONSES CATEGORIZED BY PARENTAL STATUS, FORMAL EDUCATION, AND AGE OF RESPONDENTS WHEN ASKED TO STATE ONE GOOD FEATURE OF ALBERTA'S EDUCATIONAL PROGRAM (N = 479)

If you had to state one feature of our schools that you think is good, what would this be?	Parental Status					Formal Education						Age of Respondents					Total
		Married															
Response Category	Single	N. C.	C. G. U.	P. S. O.	C. A. S.	ELEM.	H. S.	UNIV.	TECH.	OTHER	NO. ST.	Under 21	21-34	35-50	Over 50	Not Stated	
Don't know or couldn't say	33	31	22	35	60	61	89	13	11	4	3	13	74	60	31	3	181
Nothing good	2	2	3	6	5	1	10	5	--	1	1	1	9	5	2	1	18
All round good job	14	16	18	3	36	27	49	6	5	--	--	3	26	33	24	1	87
Teachers and teaching methods	5	5	2	1	33	9	23	12	2	--	--	1	19	23	2	1	46
Curriculum	7	8	3	4		3	20	10	2	2	--	3	12	16	6	--	37
Organization of school system	3	2	5	3	6	1	14	2	2	--	--	2	7	9	1	--	19
Physical facilities	2	1	7	5	11	4	19	1	2	--	--	1	7	14	4	--	26
Extra-curricular activities	1	3	1	4	3	2	8	1	1	--	--	--	6	5	1	--	12
Provision for individual differences	1	1	1	1	6	1	7	2	--	--	--	--	2	8	--	--	10
Miscellaneous replies	9	5	3	3	16	7	18	7	2	1	1	7	12	12	5	--	36
Response not indicated	1	--	1	1	4	3	2	1	--	--	1	--	3	1	3	--	7
Total	78	74	66	66	195	119	259	60	27	8	6	31	177	186	79	6	479

TABLE VIII

RESPONSES CATEGORIZED BY PARENTAL STATUS, FORMAL EDUCATION, AND AGE OF RESPONDENTS WHEN ASKED TO MAKE ONE SUGGESTION THAT WOULD IMPROVE ALBERTA'S EDUCATIONAL PROGRAM (N = 479)

If you had one suggestion to make to improve the calibre of our Educational System, what would this be?	Parental Status					Formal Education						Age of Respondent					
		Married															
Response Category	Single	N. C.	C. G. U.	P. S. O.	C. A. S.	ELEM.	H. S.	UNIV.	TECH.	OTHER	NO. ST.	Under 21	21-34	34-50	Over 50	Not Stated	Total
Don't know, couldn't say	30	28	25	25	47	52	85	5	6	4	3	10	64	46	33	2	155
Satisfied with present schools	1	4	2	--	9	7	5	2	1	1	--	--	5	7	4	--	16
Consideration of individual differences	2	2	5	2	11	4	11	5	2	--	--	2	10	7	3	--	22
Discipline (more or less of same)	7	11	4	5	16	12	25	5	1	--	--	3	15	17	8	--	43
Homework (more or less of same)	1	1	2	3	6	3	6	1	2	1	--	1	2	8	2	--	13
Teachers: Qualifications, pay, methods	7	8	8	6	29	11	31	14	[illegible]	--	--	4	17	30	5	2	58
Degree of emphasis of present curriculum	4	6	2	4	22	4	24	8	1	1	--	2	13	15	7	1	38
Extending curriculum	14	2	3	7	9	5	20	4	5	--	1	6	14	8	7	--	35
Restricting curriculum	2	3	7	4	19	7	19	6	3	--	--	--	12	18	5	--	35
Standards (lower, raise)	1	7	4	5	9	4	14	6	2	--	--	--	11	12	3	--	26
Administrative arrangements	6	--	1	2	9	3	11	2	2	--	--	2	7	8	--	1	18
Moral attitudes and values	1	2	1	2	7	5	6	1	--	1	--	--	4	8	1	--	13
Response not indicated	2	--	2	1	2	2	2	1	--	--	2	1	3	2	1	--	7
Total	78	74	66	66	195	119	259	60	27	8	6	31	177	186	79	6	479

the provincial population do live in the cities of Alberta.

Summary of Findings

There is one finding of this study that stands out above all others. This is the evident lack of interest of the sampled population in their schools. Sizeable proportions of the sampled group within the limitations of the survey method could neither criticise nor state one good feature of the schools nor make a single suggestion for their improvement. The establishment of a Royal Commission to study the status of education in Alberta has not created a marked demonstration of the typical citizen's interest in education even though the press and radio coverage of this Commission's activities has been considered generally to be excellent. When those recognizing the existence of this Commission were questioned further, less than a quarter of the total group surveyed were acquainted, even partially, with its aims and objectives. The same proportion expressed optimism about the ultimate worth of such a Commission.

This finding is all the more significant since any bias in sampling must have emanated from a group with a generally higher standard of living, access to a greater number and variety of communication outlets, and whose schools generally are staffed with teachers of higher than average qualifications and whose curriculum is much broader than generally found in the rural areas.

The study has brought out that the amount of formal education received by the respondent of the sample surveyed relates most closely to both knowledge of and willingness to criticise and suggest in educational matters. Those with the greatest amount of formal education demonstrate considerably more intelligent awareness than those with only an elementary education. While analysis of differences of responses in relation to age of the respondent or to the number of children in the family or the number that have or presently are attending or are about to attend school, are of such interest to warrant detailed statistical analysis of responses, only those relationships readily evident by inspection have been considered at this time.

It was not the purpose of this study to explain the reasons for the findings. However, they do not differ from those of other investigators. Of three recent Canadian studies (1, 2, 5), only that of Brimacombe (2) is similar to the present study. His findings are confirmed to a large extent by this study and suggests that no marked change in public attitudes has occurred in the intervening year and a half. Moreover, while those parents with children attending school showed a favorable attitude towards the schools in a similar pattern to that reported by Lindel (6) for St. Louis parents of school age children, the total population sampled in this study was found as a group to be unable or unwilling to commend their schools. Perhaps this is because the public, in general, has had no occasion to become concerned, positively or negatively, with education and prefers instead to leave such matters to the judgment of professional educators. It is only those citizens as a group having the equivalent or better formal education than these officials who openly question such matters. Perhaps the schools themselves, with the possible exception of home and school associations, have seen no reason to create citizen interest in education. It may be that what has been done in public relations by the schools and similar bodies, such as the Alberta Royal Commission on Education, has not been of a type suited to the general population but has been, as suggested by Hines and Grobman (4), more suited to the group with university or professional background. As stated earlier, this study has not attempted to answer these questions, yet they seem worthy of further investigation.

In brief, this study has shown that the average citizen is not inordinately interested in the public educational system and it may follow as a corollary that the reported outbursts and attacks on education are perhaps the product of a vocal and informed minority.

REFERENCES

1. A Survey Project of the Joint Committee on Public Attitudes Towards Our Schools, Nova Scotia Looks at Its Schools (Nova Scotia Department of Education, 1953).
2. Brimacombe, A. K. "The Construction of a Scale to Measure Adult Attitude Toward the Alberta Educational System," Alberta Journal of Educational Research, IV (June 1958), pp. 100-8.
3. Hand, Harold C. What People Think About Their Schools (New York: World Book Co., 1948).
4. Hines, Vynce A., and Grobman, Hulda, "What Parents Think About Their Schools and What They Should Know About Them," Bulletin of the National Association of Secondary School Principals (February 1957), pp. 15-25.
5. Larsen, O. P. What People Think About Their Schools, A Brochure and Summary, mimeographed, No. 4 (Alberta: County of Newell, 1954).
6. Lindel, Albert L. "What's Right With Them," The Phi Delta Kappan, XXXIV (June 1953), pp. 403-25.
7. The Public Looks at Education, Report No. 21 (Denver: National Opinion Center, 1944), p. 3.

8. Smith, Maurice M. "Comparative Social Attitudes," Journal of Educational Psychology, XXVIII (December 1937), pp. 681-93.
9. Spencer, Lyle M. What Los Angeles Educators Think of Their School System (Los Angeles: Los Angeles City Board of Education, 1953).
10. Stearns, Harry L. Community Relations and the Public Schools (Englewood Cliffs: Prentice-Hall, Inc., 1955).

JOURNAL OF EXPERIMENTAL EDUCATION
(Volume 29, Number 1, September 1960)

SCHOLASTIC ACHIEVEMENT AT IOWA STATE COLLEGE ASSOCIATED WITH HIGH SCHOOL SIZE AND COURSE PATTERN

IRVIN T. LATHROP
Long Beach State College, Long Beach, California

IOWA STATE COLLEGE, as a state supported educational institution, admits all students who graduate from Iowa high schools, regardless of the academic attainment of the student while in high school. In recent years, Iowa State College has, however, been discouraging students whose high school grades average less than C from enrolling. However, since Iowa State College is a state supported institution, if the student insists, he will be admitted.

Students who enroll at Iowa State College represent a cross section of the high schools in the state of Iowa. A major portion of the secondary schools of Iowa are represented at Iowa State College. Graduates of high schools whose enrollments range from 7 to 2,350 attend Iowa State College. To ascertain if the students from small and large high schools have the same survival-attrition ratio and achieve equally well scholastically is one of the purposes of this study.

The other purpose of this study was to ascertain whether the various course patterns available in high schools prepared equally well for entrance to Iowa State College. All students who have graduated from Iowa high schools are eligible for admission to Iowa State College regardless of the courses they have taken in high school.

Sources of Information

The over-all study, of which this was a part, was concerned with 1516 non-transfer Iowa public high school graduates who entered Iowa State College in the freshman class of 1952. The four year high school enrollment for each of the classes was obtained from the Iowa Educational Directory. For purposes of IBM coding, ten size categories were established as follows: 1) less than 25; 2) 25-49; 3) 50-75; 4) 75-99, 5) 100-149; 6) 150-199; 7) 200-299; 8) 300-499; 9) 500-999; and 10) 1000 and over.

For purposes of analysis in this part of the study, the high school course patterns were divided into four classifications as follows: 1) mathematics-science; 2) college preparatory; 3) vocational; and 4) miscellaneous. For a student to be classified into the mathematics and science pattern, a total of at least 12 semesters of mathematics and science must have been completed. These 12 semesters could not include either biology or business arithmetic. The 12 semesters included two semesters of ninth grade algebra, two semesters of plane geometry, one semester of trigonometry, one semester of either advanced algebra or solid geometry, two semesters of general science, two semesters of chemistry and two semesters of physics.

In many instances the ninth grade was included in the junior high school. Consequently first year algebra and general science were not listed on the transcript. It was assumed, however, that to have been eligible to have taken advanced mathematics, chemistry and physics, the student would have credit for beginning algebra and general science. To be classified in the mathematics and science pattern, the student must have completed both high school chemistry and physics and six semesters of mathematics.

The college preparatory high school course pattern included eight semesters of English, eight semesters of social studies and history, two semesters of algebra, two semesters of plane geometry and enough other electives to complete a four year high school course. In many instances, the student classified as college preparatory had taken two or more semesters of a foreign language, such as Latin, French, or Spanish. Another requirement for eligibility in this classification was not more than two semesters of any type of vocational education course.

* Journal Paper No. J-3403 of the Iowa Agricultural and Home Economics Experiment Station, Ames, Iowa. Project No. 170.

To be classified into the vocational category, a student must have completed at least six semesters in one of the areas of home economics, agriculture, industrial education or business education in high school. The business curriculum usually included such courses as typing, shorthand, bookkeeping, office practice and in many instances a course entitled business law.

The remaining classification, miscellaneous, was reserved for cases which did not fit into any of the foregoing pattern of courses.

The transcripts were examined for compliance with a pattern of courses in the following order of preference:

1. Mathematics and science
2. College preparatory
3. Vocational
4. Miscellaneous

For example, whenever a student could be classified as having a mathematics and science pattern and one other, he was placed in the mathematics and science classification as it was thought that at a technical institution such as Iowa State College a mathematics and science background might be more beneficial than any other.

The control variables used for the analysis of covariance in this study were high school size, ACE scores and high school grade point average. The high schools from which the 1516 students graduated were classified into ten categories and coded "0" through "9" for purposes of IBM computation. High school grade point average and ACE scores were also classified into ten categories and coded "0" through "9". The statistical methods followed were those associated with regression and discriminant analyses.

Index of High School Size

The predominance of small high schools in the state of Iowa can be readily seen by an inspection of Table I. Although considerable change took place before and during the early 20's as a result of a wave of school district consolidation, this change actually resulted in more high school districts, rather than fewer, since this movement was in reality a consolidation of a few elementary school districts to form a new district which established a high school with a resulting small enrollment. In 1911-12, there were only 260 high school districts in the state of Iowa, but in 1931-32, as a result of the consolidation movement, there were 909 high school districts. Additional changes have taken place in recent years as a result of school district reorganization as shown in Table I. From the peak number of 909 high schools in 1931-32, the number of high schools has been gradually decreasing until in 1957-58 there were 745 high schools in the state of Iowa.

Although the number of districts maintaining high schools has fluctuated over the years, the state of Iowa has been, and still remains, characterized for its adherence to the practice of small units for high school instruction. The median high school size for the school year 1957-58 was 94 students. This median was, no doubt, the highest during the past 50 years although the typical high school had almost as great an enrollment during the first decade of the century. The smallest median was 57 students in 1921-22 for any of the years summarized in Table I.

The relationship between college achievement and size of high school is a major objective of this study. Philosophical considerations, based on some objective evidence and prevailing points of view in education, point to a curvilinear relationship between size of high school and college achievement regardless of the terms in which such achievement is evaluated.

To test whether the relationship was curvilinear, a test of significance of quadratic over linear regression was made by high school size and cumulative quality point average. Since this advantage resulted in significance at the 5% level, it was desirable to assume some type of curve. Because the size of school, for convenience, had been coded for purposes of IBM tabulation, it was expedient to assign indexes of high school size to the IBM code.

It was decided to find the relationship between the cumulative quality point average and the index of high school size based upon some root of the actual high school size. By a trial-and-error method, the eighth root of the actual enrollment was determined as the index of size to be used in rectifying this relationship. The eighth root of the actual enrollment with slight rounding of numbers may be expressed on a scale of "0" to "7" as shown in Table II. The process of rectification of the relationship seemed warranted since subsequent analysis of the advantage of quadratic over linear regression yielded a nonsignificant t-value of 1.07.

The eight intervals of high school size, from "0" to "7", were designated as the index of high school size. Throughout this study, all relationships between various characteristics of students and of high schools have been made with this index of high school size rather than with the actual high school enrollment.

No claim is made that the index of high school size, as here defined, is the best function of actual enrollment. It does represent a plan of rectifying the relationship between high school enrollment and college achievement which yields a far more sensitive test of significance than assuming that the interval of high school enrollment are not numerically ordered.

Criteria of Achievement

Of major concern to anyone undertaking a pre-

TABLE I

PERCENT OF HIGH SCHOOL DISTRICTS IN EACH SIZE CATEGORY FOR THE YEARS 1901 TO 1958 AND MEDIAN SIZE HIGH SCHOOL AND MEDIAN ENROLLMENT

Size	1901-02 N=176	1911-12 N=260	1921-22 N=852	1931-32 N=909	1941-42 N=897	1951-52 N=827	1957-58 N=745
Less than 25	1.0	3.1	16.4	5.8	6.0	3.8	1.5
25	13.6	11.5	27.6	20.5	20.5	24.3	18.1
50	25.0	26.9	20.3	26.6	26.6	24.5	19.6
75	16.6	16.2	12.3	16.4	13.7	14.1	14.2
100	25.0	21.2	10.2	13.2	15.2	14.7	19.7
150	8.5	7.3	4.0	4.5	4.8	6.2	7.8
200	4.6	7.3	4.6	5.5	4.8	4.5	8.1
300	5.1	4.2	2.8	4.3	5.0	5.2	6.3
500	0.6	1.9	1.3	1.8	2.1	1.3	4.7*
1000	0.0	0.4	0.5	1.4	1.3	1.4	
Median Size School	91	88	57	72	72	72	94
Median Enrollment	134	157	152	232	267	244	308

* No breakdown available for these categories for the years 1957-58

TABLE II

INDEX OF HIGH SCHOOL SIZE

Size of High School	IBM Code	Index of Size	Cumulative Quality Point Average
Less Than 25	0	0	1.25
25-49	1	1	2.01
50-74	2	2	2.08
75-149	3-4	3	2.06
150-299	5-6	4	2.09
300-499	7	5	2.04
500-999	8	6	2.21
1000 and over	9	7	2.25
All Schools			2.12

diction study is the selection of the criterion. The criterion employed should be as valid and useful as possible, yet readily obtainable. For purposes of the present study, four criteria were employed.

The first criterion was survival-attrition tendency at the end of the first quarter of college. Survival, as here defined, was the tendency to enroll more than one quarter as a student. No attempt was made in this study to ascertain the causes of freshman attrition. Such causes presumably might include: 1) lack of scholastic ability; 2) lack of motivation for academic proficiency; 3) inadequate counseling; 4) change in economic capacity; 5) illness or death; 6) marriage; 7) transfer to other universities; 8) failure to adjust to a college environment; and 9) many other causes or combinations of causes.

Included in the survival group are freshmen 1) who might have been denied registration at the beginning of the second quarter by action of the scholarship committee, but who at some subsequent date did re-enroll at Iowa State College and 2) who had changed educational or occupational objectives as indicated by a change in curriculum at Iowa State College.

Of the 1516 freshmen included in the total study, 1384, or 91.3% survived more than one quarter. The attrition at the end of the first quarter does not seem unduly excessive. Although no evidence had been assembled in this study to indicate the magnitude of changes from a curriculum in one division to a curriculum in another division, the attrition percentage might have been considerably higher if attrition would have been defined in terms of the first chosen curriculum.

The other dichotomized criterion was concerned with graduation-attrition tendency at the end of a five year period. Graduation, as here defined, was the tendency to graduate and obtain a degree. Again, no attempt was made to ascertain the causes of student attrition. The causes might presumably include those postulated for attrition at the end of the first quarter with the added possibility of military service. There may be other causes or combinations of causes which contribute to student attrition which are unidentifiable.

Included in the graduation group were those students who were still enrolled at the end of a five year period. It was assumed that these students would eventually earn a degree. In many instances these students, who were still enrolled, were young men who had their education interrupted by military service and upon discharge from the military had re-enrolled at Iowa State College. Students who had changed from a curriculum in one division to a curriculum in another division during the five years, but who earned a degree from Iowa State College, were classified as graduating.

Of the 1516 freshmen included in the total study, 680 or 44.9% graduated. Although no evidence has been assembled in this study to indicate the magnitude of changes from one curriculum to another, the attrition percentage, no doubt, would be considerably higher if attrition again had been defined in terms of the first chosen curriculum.

The other criteria employed were quality point average at the end of one quarter of college and quality point average at the end of a five year period. For each credit earned, a student receives quality points, according to the mark attained, as follows: A, 4 points; B, 3 points; C, 2 points; D, 1 point; F, O points. The quality point average for each student at the end of the first quarter was obtained by dividing the number of quality points attained by the number of credits attempted.

The quality point average at the end of a five year period, designated as cumulative quality point average, was obtained by dividing the total number of quality points earned for the five years by the number of credits attempted for the five year period.

One of the major causes of student attrition is an unsatisfactory achievement as reflected by low or failing quality point averages. Since one of the causes of attrition is unsatisfactory achievement as indicated by a low quality point average, there should be a substantial correlation between survival-attrition tendency and quality point average. A biserial correlation of 0.325 was found between survival-attrition tendency and first quarter quality point average for students included in this study. This correlation was of sufficient magnitude to be significantly different from zero. However, it was not as high as one might expect if the only cause of student attrition was low quality point average.

The biserial correlation between graduation-attrition tendency and cumulative quality point average at the end of a five year period was 0.372 which was slightly higher than the correlation found for the first quarter. The magnitude of these correlations would seem to indicate that, to a large degree, the criteria are somewhat different measures of college achievement.

It should be pointed out, however, that these correlations may be smaller than would normally be anticipated because the students who transferred to other universities were placed in the attrition category. Another factor contributing to the lowering of the correlations is the unreliability of the four criteria.

The purpose of secondary education has been stated in terms of developing the person into an effective member of a democratic society. The criteria here chosen are useful in evaluating the effect of various high school course patterns and size of high school in only one respect, that of preparation for study at Iowa State College. It is not the purpose of this study to evaluate the various high school course patterns in terms of the objectives for which they may have been designed.

The four criteria, however, constitute legitimate standards of evaluating the size of high school and high school pattern from the viewpoint of potential students at Iowa State College. These students represent approximately one in every twelve graduates of the public high schools in Iowa.

Findings

To ascertain whether the size of the high school from which a student graduated had any significant effect on achievement at Iowa State College, a sample of 180 cases was drawn at random from the 1516 included in the total study. The sample of 180 cases was used in an effort to minimize the effects of the confounding of high school size and high school course pattern. As can be seen by Table III, agriculture appears to be a course pattern offered predominantly in the middle size high schools, whereas industrial education, to the degree necessary to be included in this study, is offered mostly in the larger high schools.

To obtain enough cases from each of the course patterns for analysis, high school size was classified into three categories: under 100, 100-499, and 500 or greater enrollment. To further simplify the analysis, the agriculture, home economics, industrial education and business course patterns were combined into one pattern, classified as vocational. Thus, for the analyses, the four high school course patterns of mathematics and science, college preparatory, vocational and miscellaneous were used.

Disproportionality existed among high school course patterns and high school size as shown by Table IV. There were only 15 of the 1516 students included in this study who entered Iowa State College from high schools of under 100 with the mathematics and science course pattern, whereas there were 197 students who entered Iowa State College from high schools of 500 or over with this same course pattern. However, the largest number of students who entered Iowa State College with the miscellaneous course pattern came from smaller size schools. The confounding effect of high school course pattern and high school size is indicated by a chi square of 242 which is significant far beyond the 1% level.

In order to eliminate this confounding effect between high school size and high school course pattern, the number of cases in each cell of Table IV was randomly sampled down to 15, the number appearing in the smallest cell. In each group of 15 students, there was a proportional number drawn at random from each of the divisions of the college, making a total of 180 students.

Index of high school size, ACE score and high school grade point average were used as variables. A correlation coefficient computed between index of high school grade point average on the entire group of 1516 students yielded a value of -0.184 which was significantly different from zero. Thus, it would appear from this correlation that high school grades are partially a function of high school size. It is a negative relationship, meaning that students from smaller high schools tend to have higher high school grade point averages. A correlation coefficient computed between the index of high school size and ACE scores yielded a value of 0.055 which was not significant with 1516 students.

The correlation between the index of high school size and the four criteria are shown in Table V. The correlations are shown without control, with control on ACE scores, with control on high school average and with control on both ACE scores and high school grade point average.

The coefficients between the index of high school size and the two dichotomized criteria were not significant, regardless of what other variable or combination of variables were controlled. However, with the two criteria of quality point averages, the correlations were significant when controlling on high school grade point averages and when controlling on both ACE scores and high school grade point averages.

It appears that whenever high school grade point average was used as a controlling variable it raised the relationship of the index of high school size the the two criteria of quality point averages to a magnitude which was significant. Thus, it would appear that whenever first quarter or cumulative quality point averages were used as criteria, controlling on high school grade point average might possibly introduce some bias. Any bias which high school grade point average might introduce as a control variable should not, however, preclude its use in a prediction equation. The techniques of regression and discriminant analyses were employed in this study. To find whether high school size had significant effect on achievement at Iowa State College, the index of high school size was eliminated as a prediction variable and the loss tested for significance. The regression equations and the coefficients of correlation here reported are those obtained within the high school pattern of courses.

Because of the possibility of bias being introduced by using both the index of high school size and high school grade point average as control variables, the index of high school size was eliminated as a control for subsequent analyses. Analysis of covariance was employed to test whether the high school pattern of courses had a significant effect on college achievement.

Survival-Attrition Tendency

The first criterion used to measure student achievement was survival-attrition tendency at the end of the first quarter of college. The percent-

TABLE III

PATTERN OF COURSES OF STUDENTS AT IOWA STATE COLLEGE
BY HIGH SCHOOL SIZE

Size	Math. - Science	Ag.	Home Ec.	College Prep.	Industrial Ed.	Business	Misc.	Total
Less Than 25	0	0	0	0	1	1	1	3
25	3	1	2	13	0	22	27	68
50	6	13	7	30	5	34	48	143
75	6	14	6	39	0	32	40	137
100	18	35	9	57	7	28	56	210
150	16	16	4	32	3	11	12	96
200	38	26	8	39	8	12	9	140
300	73	30	5	67	16	16	21	228
500	118	7	1	86	48	23	11	294
1000+	79	0	8	69	24	5	12	197
Total	357	145	50	432	112	184	236	1516

TABLE IV

PATTERN OF COURSES OF STUDENTS AT IOWA STATE
BY THREE HIGH SCHOOL SIZE CATEGORIES

Size	Math. -Science	College Prep.	Vocational	Miscellaneous	Total
Under 100	15	82	138	116	351
100-499	145	195	236	98	674
500 or more	197	155	116	23	490
Total	357	432	490	237	1516

TABLE V

COEFFICIENTS OF CORRELATION BETWEEN THE INDEX OF HIGH SCHOOL SIZE AND THE FOUR CRITERIA

Criterion	No Control	Within Pattern Correlation with Control		
		ACE	HSA	Both
First Quarter Quality Point Average	0.158	0.015	0.232	0.181
Cumulative Quality Point Average	0.090	0.006	0.197	0.152
Survival-Attrition Tendency	0.180	0.018	0.074	0.058
Graduation-Attrition Tendency	0.079	0.012	0.093	0.052

age of students surviving past the first quarter for the four high school course patterns were:

Mathematics-science	95.6%
College preparatory	97.8%
Vocational	91.1%
Miscellaneous	82.2%

An analysis of the course patterns yielded an F-value of 40.8 which was significant well beyond the 1% level. Thus, from an analysis in which high school size, ACE score and high school grade point average were ignored, it appeared that the high school pattern of courses had an effect on survival-attrition tendency at the end of the first quarter of college.

A discriminant equation to predict the chances in 100 of any given student surviving past the first quarter was developed. Even though the index of high school size contributed but little to prediction, it was included along with the ACE score and the high school grade point average for predicting survival.

Because the analysis of variance of survival-attrition tendency among high school course patterns does not take into account differences in high school size, ACE score or high school average, the more refined technique of analysis of covariance was used to control on these variables. The analysis of covariance among high school course patterns was computed and an F-value of 39.7 was obtained. This F-value was significant well beyond the 1% level, indicating that with control on high school size, ACE score and high school grade point average, the high school pattern of courses had an effect on survival attrition tendency for the first quarter of college.

The index of high school size makes little contribution to either prediction or control when the effects of the confounding with course pattern are eliminated. For this reason, analysis of covariance was computed without the use of the high school size as a control variable. This F-value was not appreciably different from that attained when three control variables were used.

When using the criterion of survival-attrition tendency at the end of the first quarter, the index of high school size has little value for predicting survival or as a control variable for the analysis of covariance among high school course patterns. However, the chances of a student surviving past the first quarter at Iowa State College varies with the high school pattern of courses.

First Quarter Quality Point Average

The other criterion employed for evaluating student progress at the end of the first quarter was quality point average. The mean first quarter quality point averages for the four high school course patterns were:

Mathematics-science	2.53
College Preparatory	2.41
Vocational	2.17
Miscellaneous	1.60

An analysis of variance of the course patterns yielded an F-value of 11.0 which was significant beyond the 1% level. Again, when high school size, ACE score and high school grade point average were ignored, the pattern of courses a student completed in high school had an influence on quality point average at the end of the first quarter.

A regression equation was developed for predicting a first quarter quality point average for any given student using the three variables of high school size, ACE score and high school grade point average. The loss due to the elimination of the index of high school size was computed and an F-value of 6.0 was obtained which was significant at the 5% level. A partial coefficient of correlation between the index of high school size and first quarter quality point average, holding constant ACE score and high school grade point average, was 0.181. However, both the F-value and the correlation may have been unduly high due to the possible bias suggested by a significant correlation between the index of high school size and the high school grade point average. Because of the possibility of this bias existing, another regression equation was developed without the index of high school size.

The more refined technique of analysis of covariance was used to control on high school size, ACE score and high school grade point average. The analysis of covariance of first quarter quality point average among high school course patterns yielded a nonsignificant F-value. Evidence from this group of students failed to reveal any difference among high school course patterns when evaluated in terms of first quarter quality point average for students who are statistically equated on high school size, ACE score and high school grade point average.

The high school pattern of courses had little effect on first quarter quality point average when either of the two variables of high school size or high school grade point average were used as control variables. However, when ACE score alone was used as a control variable, the high school pattern of courses had an effect on the quality point average a student earns at the end of the first quarter of college.

Too much confidence should not be placed in student achievement, either survival-attrition tendency or quality point average, when evaluated at the end of one quarter of college. It would seem reasonable to expect that the reliability of the criteria would be increased as evidence is accumulated over a longer period of time.

Graduation Attrition Tendency

Survival past the first quarter is an indication of eventual graduation. However, it is no guaran-

tee of graduation as evidenced by the fact that less than 55% of the students who survived the first quarter evantually graduated. The percentage of students graduating from Iowa State College for each of the four high school course patterns was:

Mathematics-science	57.8%
College preparatory	62.2%
Vocational	51.1%
Miscellaneous	26.7%

An analysis of variance of the course patterns yielded an F-value of 5.4 which was significant at the 1% level. From an analysis in which high school size, ACE score and high school grade point average have been ignored, it appears that the high school pattern of courses had an influence on graduation-attrition tendency at Iowa State College. Equations were developed utilizing: 1) the high school size, in addition to the ACE score and high school grade point average and 2) the ACE score and high school grade point average alone.

The index of high school size did not contribute much as a prediction variable as none of the partial coefficients of correlation were significant. A multiple correlation between the index of high school size and ACE score with graduation-attrition tendency was 0.3155, whereas the correlation between ACE score alone and graduation-attrition tendency was 0.3153.

The amount that the sigma value would change from the largest to the smallest size high school is only 0.028 which would seldom change the graduation percentage more than two percent. This slight difference would be of no practical use in the counseling of students.

Because analysis of variance does not take into account differences in student ability, the more refined technique of analysis of covariance was used to control on high school size, ACE score and high school grade point average. When these three variables were used as controls, the high school pattern of courses had no significant influence on graduation-attrition tendency. Another analysis of covariance was computed using ACE score alone as a control. When ACE score alone was used as a control, the high school pattern of courses affected the graduation-attrition tendency at Iowa State College.

When using the ctiterion of graduation-attrition tendency at the end of a five year period, the index of high school size has little value for predicting graduation or as a control variable for the analysis of covariance among high school course patterns. If ACE score alone is held constant, the chances of a student surviving the first quarter or graduating from Iowa State College varies with the course pattern which he completed in high school.

Cumulative Quality Point Average

The other criterion employed for evaluating student progress at the end of a five year period was cumulative quality point average. The mean cumulative quality point averages for the four high school course patterns were:

Mathematics-science	2.39
College preparatory	2.33
Vocational	2.29
Miscellaneous	1.63

An analysis of variance of the course patterns yielded an F-value of 10.41 which was significant at the 1% level. When high school size, ACE score and high school grade point average were not considered, the high school pattern of courses had an influence on cumulative quality point average at Iowa State College.

Again, regression equation were developed for predicting an individual student's cumulative quality point average. One regression equation was developed using the three variables of high school size, ACE score and high school grade point average. Other equations were developed without the use of high school size.

Analysis of covariance among high school course patterns was used to control on the index of high school size, ACE score and high school grade point average. With these three variables controlled, the analysis yielded a nonsignificant F-value. Another analysis of covariance was computed using ACE score alone as a control variable. This analysis yielded an F-value which was significant at the 5% level. It appeared that the quality point average which a student earned varied with his high school pattern of courses when ACE score alone was held constant.

More confidence can probably be placed in student achievement, either graduation-attrition tendency or quality point average, when evaluated at the end of a five year period. The reliability of the criteria was undoubtedly increased by evaluating at a later date in the student's academic career.

The use of high school average as a control variable in the analysis of covariance among high school course patterns is open to some limitations. To be entirely satisfactory, the high school grade point average, for the same quality of performance, should be identical regardless of the size of high school. No direct evidence was available to substantiate or refute this principle. Some indirect evidence suggests that the smaller high schools tend to give higher grades than the larger high schools as indicated by a coefficient of correlation of -0.184.

It does not necessarily follow from this correlation that the standard of grading varies with size of school. It might be that Iowa State College is drawing a better caliber of students from small high schools than from large high schools. This latter interpretation does not seem tenable, however, when we note the nonsignificant correlation of 0.055 between ACE score and size of high school.

TABLE VI

PERCENTAGE CONTRIBUTIONS TO VARIANCE OF COLLEGE ACHIEVEMENT BY PREDICTION VARIABLES

Criterion	Index of High School Size	High School Course Pattern	ACE Score	High School Grade Point Average	Unexplained
Survival-Attrition	0.2	65.4	1.4	2.9	30.1
First Quarter Quality Point	0.8	0.5	12.9	33.0	52.8
Graduation-Attrition	0.1	3.0	6.4	8.8	81.7
Cumulative Quality Point	0.4	1.0	9.9	32.2	56.5

College Achievement and Size of High School

Little evidence can be found concerning the relationship of size of high school to college achievement except in a sample in which the confounding effect with high school course pattern has been eliminated. This has been done in the foregoing analyses by reducing the number of students in the study from 1516 to 180.

In this sample, the contributions to the variance of college achievement by size of high school has been computed and is shown in Table VI. It can be seen that in no case does the percentage contribution of high school size reach one percent when index of high school size, ACE score, high school average and high school course pattern are considered. The negative relationship between the index of high school size and high school grade point average sugeests that the percentage contributions of the index of high school size, small though they be, are inflated. If the contribution of high school size is determined when only ACE score and high school course pattern are considered, the contribution of the index of high school size in no case reaches one-tenth of one percent. This suggests that the size of high school, in itself, is almost unrelated to college achievement, although it doubtless is a considerable factor in determining the type of course pattern available in the high school.

Summary

Because disproportionality existed between the size of the high school from which a student graduated and the high school course pattern, a sample of 180 cases was drawn at random from the total sample of 1516 students. When using the criterion of survival-attrition tendency, the size of the high school had little value as a prediction variable or as a control variable in the analysis of covariance. However, the chances of a student surviving the first quarter varies with the high school pattern of courses which he completed.

When achievement is evaluated in terms of quality point average at the end of the first quarter, the size of high school has little value as a prediction variable or as a control variable in the analysis of covariance. When ACE score alone was held constant, the first quarter quality point average varied with the pattern of high school courses completed.

When graduation-attrition tendency is used as a criterion to evaluate student achievement, the high school size has little value for predicting graduation or as a control variable when using analysis of covariance. When ACE score alone was held constant, the chances of a student graduating varied with the high school course pattern.

When cumulative quality point average is used to evaluate student achievement, the size of the high school may be disregarded. When ACE score alone was held constant, the cumulative quality point average varied with the high school pattern of courses.

From analysis on a proportional sample, it appears that the size of the high school from which a student graduated has little influence on achievement at Iowa State College when the confounding effect high school size and course pattern is eliminated. The pattern of courses a student completes in high school greatly influences his achievement at Iowa State College. It seems reasonable to conclude that, if the small high schools could offer the diversity of courses that the larger high schools offer, there would be no difference in the college achievement of graduates from the large and small high schools.

JOURNAL OF EXPERIMENTAL EDUCATION
(Volume 29, Number 1, September 1960)

A STUDY OF UNDERGRADUATE RECORDS OF GRADUATES FROM HUNTER COLLEGE WHO LATER EARNED DOCTORATES

EDITH B. CHASE
Hunter College, New York City

IN THE FALL of 1957, the Office of Scientific Personnel of the National Academy of Sciences and the National Research Council sent to each college a list of its graduates who had been awarded the doctorate by other institutions between the years 1936 and 1956. With this list were given for each individual the date of the baccalaureate and the field and date of the doctoral degree. This information seemed to offer an excellent opportunity to ascertain for a complete group of students who came from a single undergraduate body and who later earned the doctorate, the degree to which the quality of undergraduate work indicated potential doctoral material, and to determine any differences between the records of prospective graduate students in different disciplines.

Of the 304 names on the list, ten were omitted for various reasons. Of the individuals included in this study, all but 13 were women, for, until veterans were admitted in 1946, male students were limited to a very small number in the evening session. From the undergraduate record of each student named in the list, the following data were obtained: Cumulative index (each credit of A counting 4 points, B three points, C two points, D one point, and F no points); Index of first semester; Index of courses in the field of the future doctorate or of the major, if related to the doctorate (i.e., Chemistry major for doctorate in Biochemistry); High school average (where recorded); Honors (Junior Phi Beta Kappa, Senior Phi Beta Kappa, summa cum laude, magna cum laude, and cum laude); Country of birth of student and parents where recorded.

The students at this college differed in some respects from students in most other colleges, since they attended a free tuition non-residential college in the city of New York. That recent immigrants to this country took advantage of the opportunity for a free education for their children is indicated by the following facts. Of 270 students for whom the country of birth was recorded, 42, or 16%, were foreign born. Of 114 students entering between 1923 and 1939 when the birthplace of the parents was recorded, it was found that both the parents of 63, or 55%, were foreign born, one of the parents of 20 students, or 18%, was foreign born; while 31 students, or 27%, had both parents native born.

Since it seemed desirable to obtain some indication of the way in which the records of the students who subsequently earned the doctorate compared with records of all the students for the same period, a random sample of 294 of the latter was chosen. To offset any changes in grading standards over this period of years, the same number of individuals was picked from each graduating class as was included in the original list. The records were chosen by applying numbers from a list of random figures (2) to the numbered alphabetized list of graduates for each semester. The data taken from each record included in the random sample were limited to the cumulative index, the index of the first term, and honors.

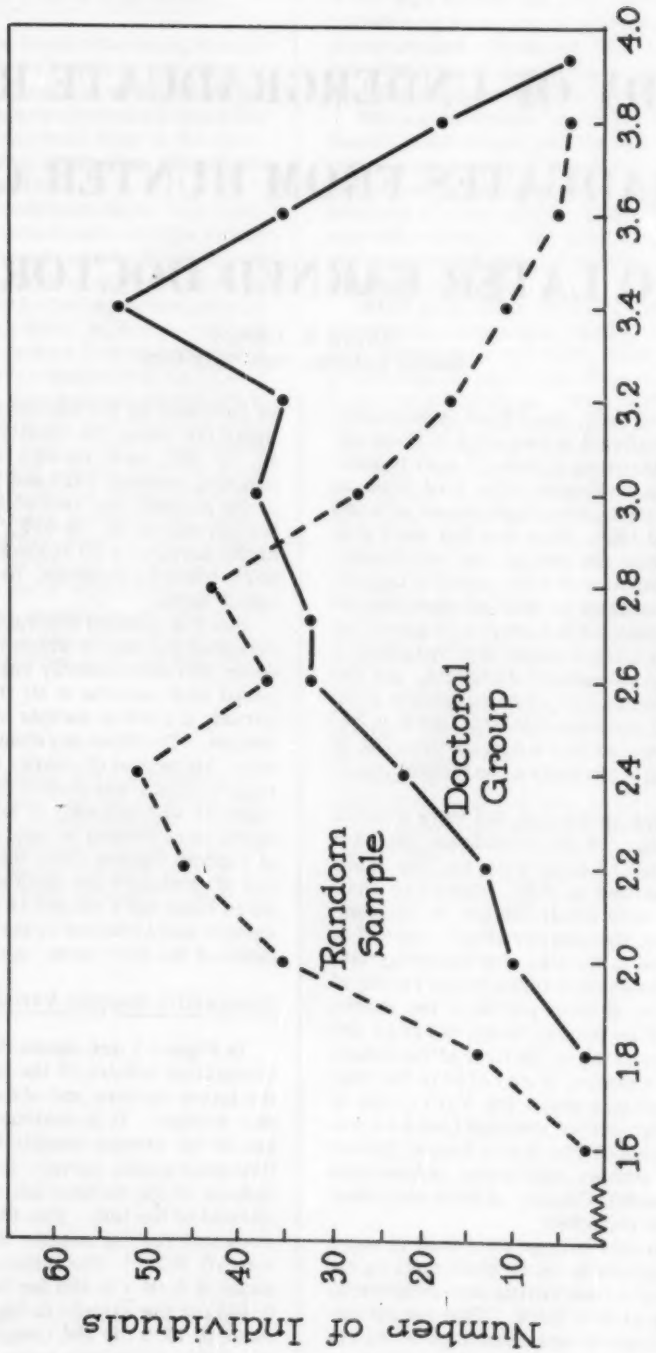
Prospective Doctors Versus the Average Student

In Figure 1 are shown the distributions of the cumulative indices of the undergraduate records of the future doctors and of the individuals of the random sample. It is obvious that, whereas the indices of the random sample fall into a curve which, like most grade curves, is skewed to the right, the indices of the doctors fall into a curve which is skewed to the left. The Pearsonian measure of skewness for the sample is -0.248 and for the doctors +0.302.[1]* The difference of 0.48 between the mean of 3.04 $\pm$ 0.496 for the doctors and 2.56 $\pm$ 0.466 for the sample is highly significant with a t value of 12.3 for 294 cases of each. The probability of this difference being insignificant is less

* Footnotes will be found at the end of the article.

FIGURE 1

DISTRIBUTION OF CUMULATIVE INDICES OF STUDENTS WHO LATER EARNED THE DOCTORATE AND OF STUDENTS IN THE RANDOM SAMPLE



than 0.001.

In Figure 2, the distributions of the indices for the first term in college are shown for the doctors and for the sample. The curves here are plotted with intervals of 0.3 in indices instead of 0.2 as was used in Figure 1, because, with the wider range of the indices of the first term and the tendency for sets of grades earned in a single semester to fall into patterns, the interval of 0.3 was found to give a clearer picture of the distribution. Here both curves are skewed to the left, due to the very low grades of some beginning students, but there are more individuals with indices above 3.0 among the doctors than among students in the random sample. The differences between the mean of 2.81 ± 0.69 for the 294 doctors and 2.30 ± 0.66 for the sample is 0.51 with a t value of 9.0 and the probability of a random occurrance less than 0.001.

To determine the degree of correlation between the cumulative indices for the entire undergraduate period and the first term grades, the coefficient of correlation was calculated for each group. For the sample the coefficient of correlation was 0.71 with a t value of 17.41, the agreement of the two indices having a high significance with a probability factor less than 0.001. For the doctors, the coefficient of correlation was considerably higher, 0.86 with a t value of 29.05 and a probability far below 0.001.[2]

The coefficient of correlation was also determined for the cumulative indices of the doctors and their high school averages where the latter were available. These data are not particularly reliable because admission to the college during some periods was based on the weighted average of high school grades and at other times on the weighted average of the Regents' Examinations of New York State which were highly variable. Nevertheless, the coefficient of correlation of the 266 records included was 0.66 with a t value of 14.11 and a probability of less than 0.001.

It is seen therefore, as was expected, that the undergraduate grades of students who later earned the doctorate are significantly higher than those of the average student, even in grades earned in the first term and at the high school level. The surprising fact, however, is the occurrence of low grades at all three levels of a few students who later obtained the doctorate. Among the 294 students in this group, four were dropped for poor scholarship at some time during their undergraduate years, and later earned rematriculation by attending courses given in the evening session as non-matriculated students. Two of these students obtained the doctorate in Education, one in Chemistry and one in Psychology.

Value of First Term Index as an Indicator of Academic Potential

There is currently in many colleges an interest in providing an enriched and stimulating curriculum for students with potentialities for superior work and advanced study. To this end, it is highly desirable to be able to identify a large majority of these students near the beginning of their college course. For this the first term indices and cumulative indices of the doctoral group were compared to determine with what reliance success as lower freshmen is a predictor of success in the total college curriculum.

In Table I is shown a comparison between the first term indices and the cumulative indices grouped in intervals of 0.5. Of 50 students with a first term index of 3.5 or above, 39, or 78%, finished with a cumulative index in the same range, and the remaining 22% had indices above 3.0. Of 90 with a first term index between 3.0 and 3.4, 92% completed their college work with an index of at least 3.0, with only 8% in the group below 3.0. Of 89 students with a first term index below 2.5, only two reached a 3.0 cumulative index.

In Table II is a similar comparison of the first term indices and cumulative indices of the random sample. The lower academic success of the 294 persons composing the random sample as contrasted with the similar number shown in Table I is apparent. If, however, we examine the most superior among the random sample, it is evident that the conclusions reached above hold. Five of nine students with a first term index above 3.5 had a cumulative index above 3.5, and the four others had cumulative indices above 3.0; of those having a first term index of 3.0 to 3.4, 27 (66%) completed their undergraduate work with an index above 3.0.

The outcome of this survey indicates that superior students in almost all cases are superior in their first term, especially in the more outstanding group, and a selection of students with a first term index of 3.5 or above would yield a group with a high percentage of prospective worth as doctoral candidates.

Comparison of Grades of the Doctoral Group in Different Fields

For a comparison of the grades of the doctoral group in the different divisions of subjects, the undergraduate records were separated into the main fields in which the different disciplines were grouped in the report by the Office of Scientific Personnel.[3] Included within the physical sciences are chemistry, geology, mathematics and physics; within the biological sciences, biology, biochem-

FIGURE 2

DISTRIBUTION OF FIRST TERM INDICES OF STUDENTS WHO LATER EARNED THE DOCTORATE AND OF STUDENTS IN THE RANDOM SAMPLE

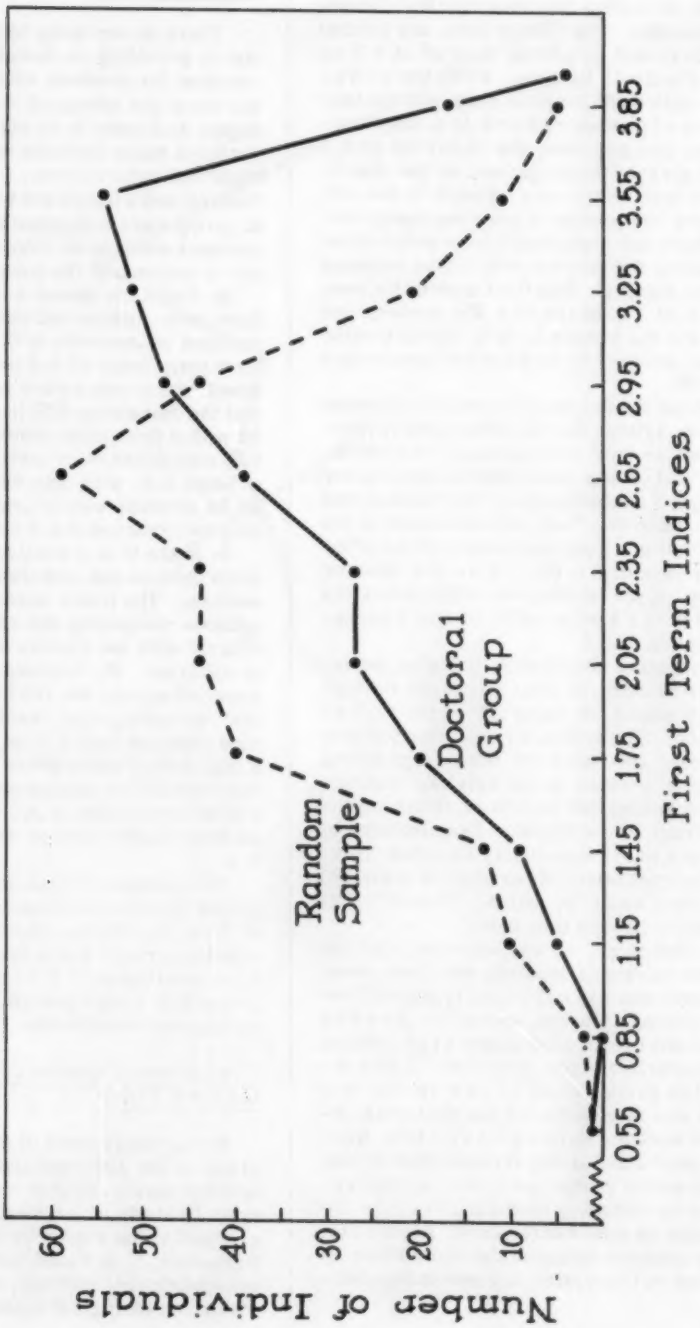


TABLE I

COMPARISON OF FIRST TERM INDICES AND CUMULATIVE INDICES OF 294 STUDENTS WHO LATER EARNED THE DOCTORATE

Cumulative Indices	First Term Indices						
	0.4-0.9	1.0-1.4	1.5-1.9	2.0-2.4	2.5-2.9	3.0-3.4	3.5-4.0
1.6-1.9	0	1	1	2	0	0	0
2.0-2.4	1	11	13	13	5	0	0
2.5-2.9	0	0	12	33	31	7	0
3.0-3.4	0	0	0	2	28	64	11
3.5-3.9	0	0	0	0	1	19	39

TABLE II

COMPARISON OF FIRST TERM INDICES AND CUMULATIVE INDICES OF 294 STUDENTS IN THE RANDOM SAMPLE

Cumulative Indices	First Term Indices						
	0.4-0.9	1.0-1.4	1.5-1.9	2.0-2.4	2.5-2.9	3.0-3.4	3.5-4.0
1.6-1.9	1	8	12	4	2	0	0
2.0-2.4	4	17	39	50	10	0	0
2.5-2.9	0	1	11	23	45	14	0
3.0-3.4	0	0	1	1	15	21	4
3.5-3.9	0	0	0	0	0	6	5

istry, biophysics, physiology, pharmacology and premedical work; within the arts and humanities, fine and applied arts, business, classical languages and literature, English and American literature, humanities, home economics, library and archival sciences, law and jurisprudence, linguistics, modern foreign languages and literature, music, philosophy and speech; within the social sciences, anthropology, archeology, economics, geography, history, political science and sociology. Psychology and Education were treated as separate fields.

In Table III, the average cumulative index for the students in each of these fields is given in the second column. With the exception of Education, the differences between the groups are small. By computing the estimated variance (1) of these groups, we obtain an F value of 1.3, with a probability greater than 0.10, indicating that these differences are not significant.

The average for those who obtained the doctorate in Education[3], however, differed widely from the averages of all the other groups. The curves of distribution of the indices for these two groups have been plotted in Figure 3, along with the curve for the random sample. The curve for the doctors in Education is bimodal; the mode of the majority, 2.4, coincides with the mode of the random sample, and the mode of the minorty, 3.4, coincides with the mode of the non-education doctors. The difference of 0.47 between the means of the education and non-education groups is highly significant with a t value of 7.1 and a probability less than 0.001. The difference of 0.15 between the mean of the sample and the mean of the education group is barely significant with a t value of 2.0 and a probability of 0.05. The distribution of indices in all other fields fell into curves similar to that of the non-education group.

The explanation of the bimodal curve in the education group can only be surmised. It cannot be explained by the assumption that superior students obtained the degree soon after graduation, while mediocre students teaching at the secondary or elementary level started graduate work later or took more time to complete it, since the average index was 2.63 for 13 obtaining the degree within ten years, 2.68 for 40 persons taking between 11 and 20 years, and 2.70 for 11 taking between 21 and 33 years.

Although there are no significant differences between the average indices of the fields, with the exception of Education, the picture is somewhat different when the averages of separate subjects are compared. In Table IV are listed the average indices of all subjects, except Education, in which there were three or more individuals. The means vary from 3.61 for Mathematics to 2.81 for Sociology. By computing the estimated variance for these groups, we get an F value of 1.91, with a probability less than 0.05. In the fields defined above, such widely divergent subjects as Mathematics and Geology are both grouped together in the field of physical sciences, a fact which tends to obscure the differences between the subjects.

Comparison of Cumulative Indices Versus Indices Obtained in Field of Doctorate

In order to determine to what extent special abilities in particular subjects may be obscured by the application of the cumulative index to cover all undergraduate work, the indices earned in the subject of the doctorate were determined, or in the major if related to the doctorate; i.e., in an undergraduate Chemistry major for a person obtaining the doctorate in Biochemistry. Whenever less than six credits were taken in the subject of the doctorate, individuals (29) were omitted from this study. In the third and fourth columns in Table III are shown the number of students in each field and the average index in the doctoral subject, and in the last column are given the differences between the cumulative index and the index in the subject of the doctorate. The index in all cases in the field of Education is for courses taken as a minor or as optionals, since a major in Education has never been offered at Hunter College. The average index in their various undergraduate major for those who earned a doctorate in Education is 2.79.

In most cases the average in the subject of the doctorate or a related major is higher than the average cumulative index which includes the major. In the physical and biological sciences there are, however, 12 cases where the subject index is lower, whereas in the social sciences there are only two, and none in the arts and humanities. In part this may account for the smaller differences between the cumulative indices and indices in the subject of the doctorate in the physical and biological sciences, 0.22 and 0.24 as compared with the social sciences and arts and humanities, 0.39 and 0.37 respectively. In the arts and humanities, one factor may be the number of individuals with foreign backgrounds who majored in the language of their native country, as the difference in indices for modern foreign language and literature is 0.50.

Distribution of Honors

The differences in grade indices reviewed above are reflected also in the data on honors, which are awarded, of course, on the basis of cumulative indices. Table V shows for each field the number and percent of those who received Junior and Senior Phi Beta Kappa, and graduation honors of summa cum laude, magna cum laude and cum laude. The physical sciences head the list with the arts and humanities second. Awards in Education are only slightly greater than those in the random sample, again pointing to the disparity seen in Figure 3. Mathematics, although included above in the physical sciences, is listed separately

TABLE III

COMPARISON OF THE AVERAGE UNDERGRADUATE CUMULATIVE INDICES AND THE AVERAGE UNDERGRADUATE INDICES IN THE SUBJECT OF THE DOCTORATE IN DIFFERENT FIELDS

Field	Number of Individuals	Average Cumulative Index	Number of Individuals	Average Index in Doctoral Subject	Difference between indices
Physical Sciences	37	3.26	37	3.48	.22
Arts and Humanities	74	3.17	73	3.54	.37
Biological Sciences	53	3.11	52	3.55	.24
Psychology	33	3.07	21	3.51	.44
Social Sciences	33	3.06	30	3.45	.39
Education	64	2.71	52	2.99	.28
Non-Education	230	3.18	213	3.47	.29
Total	294	3.04	265	3.37	.33

FIGURE 3

DISTRIBUTION OF THE CUMULATIVE INDICES OF STUDENTS WHO LATER EARNED THE DOCTORATE IN EDUCATION; OF STUDENTS WHO EARNED THE DOCTORATE IN SUBJECTS OTHER THAN EDUCATION AND OF STUDENTS IN THE RANDOM SAMPLE

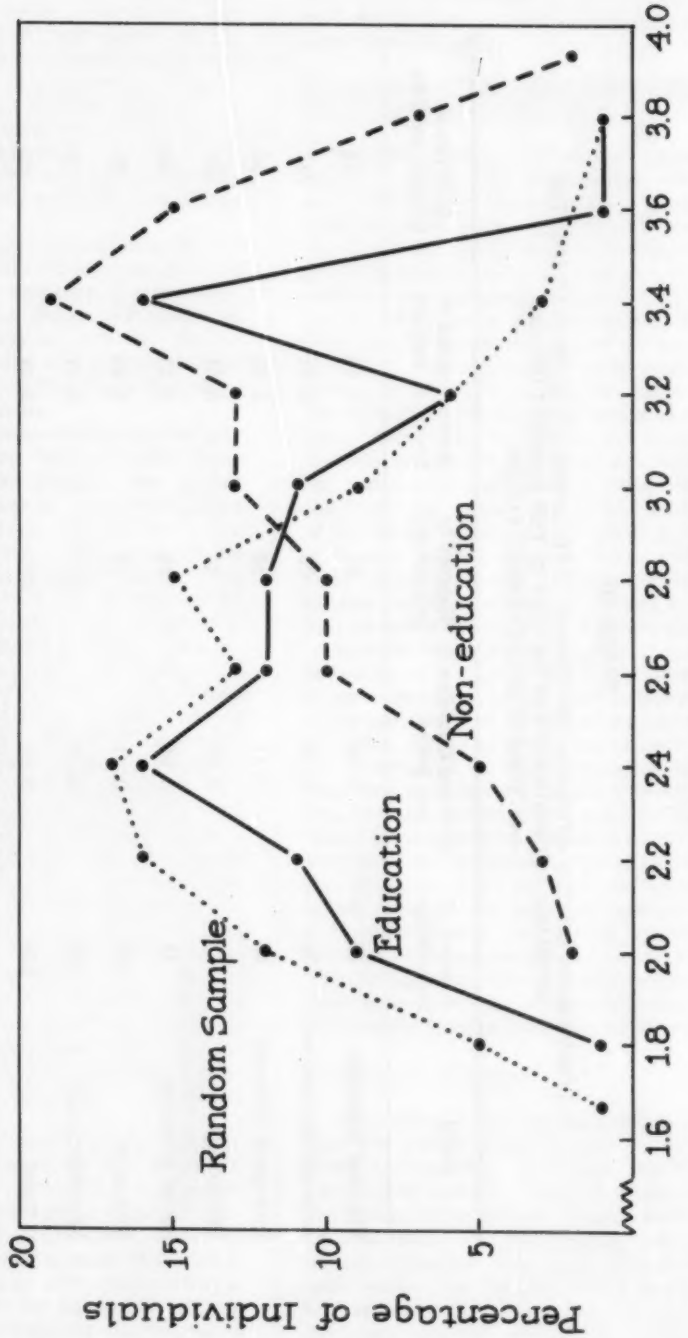


TABLE IV

COMPARISON OF THE AVERAGE CUMULATIVE INDICES FOR EACH SUBJECT IN WHICH THERE WERE THREE OR MORE STUDENTS WHO EARNED THE DOCTORATE

Subject	Number in Group	Average Cumulative Index
Mathematics	8	3.61
Classical Languages	7	3.47
Anthropology	6	3.28
Law and Jurisprudence	4	3.25
Physics	8	3.23
Biochemistry	8	3.18
English and American Literature	18	3.16
History	10	3.15
Modern Foreign Languages and Literature	29	3.11
Chemistry	17	3.09
Biology	37	3.02
Psychology	33	3.02
Economics	7	3.00
Philosophy	5	3.00
Physiology	6	2.95
Geology	3	2.83
Sociology	6	2.81

Analysis of variance gives a value for F of 1.91 and for P of less than .05.

TABLE V

DISTRIBUTION OF UNDERGRADUATE HONORS AMONG THE STUDENTS IN THE DIFFERENT FIELDS IN WHICH DOCTORATES WERE EARNED

Field	Number in Group	Phi Beta Kappa				Graduation Honors				
		Junior	Senior	Total	% of group	Summa cum laude	Magna cum laude	Cum laude	Total	% of group
Physical Sciences	37	13	8	21	57%	3	7	10	20	54%
Arts and Humanities	74	15	16	31	42%	3	11	24	38	51%
Biological Sciences	53	9	11	20	38%	1	4	17	22	42%
Psychology	33	2	10	12	36%	2	2	7	11	33%
Social Sciences	33	5	6	11	33%	2	1	8	11	33%
Education	64	1	4	5	8%	0	0	11	11	17%
Total	294	45	55	100	34%	11	25	77	113	39%
Non-Education	230	44	51	95	41%	11	25	66	102	44%
Sample	294	5	20	25	9%	1	4	25	30	10%
Mathematics	8	7	0	7	88%	3	4	0	7	88%

because of the outstanding record of seven high awards in each category conferred within a group of only eight undergraduates.

Male Versus Female Students

Of the 13 male students included in this study, 12 admitted in 1946 or thereafter graduated in 1949 or 1950, and so had obtained the doctorate by 1956 when this study ends, in a maximum of six or seven years. Their cumulative indices ranged from 3.3 to 3.7, with an average of 3.4. Only three women of those graduating in 1949 or 1950 had earned the doctorate by 1956, with individual indices of 2.8, 2.9 and 3.9 and an average of 3.2. During this period there were 357 male graduates as compared with a total of 2,358 female graduates, a ratio of one to 6.61. Thus the ratio of graduates earning the doctorate within six or seven years was approximately 26.4 men to one woman. This suggests that qualified women, due to marriage and their different role in society, tend to delay the pursuit of a doctorate or do not undertake it at all.

Discussion

The first objective of this study of the records of undergraduates from a single college who later earned a doctoral degree was to determine the quality of these students as compared with a random sample of the student body. The latter sample was composed of the same number of individuals for each class, selected randomly as described above, as the classes had contributed to the doctoral group. The results show that the average of the undergraduate records of the doctoral group is considerably higher than the average of the random sample with a difference (0.48) that is definitely significant ($P<0.001$). The distribution of the grades of the doctoral group is represented by a curve skewed to the left while the curve of the random sample is skewed to the right (Figure 1).

A comparison of the indices of the first term of the two groups presents a similar picture (Figure 2). In the latter chart, the tails in each case extend farther to the left than in Figure 1 because lower averages may occur in the first term than are permissible for graduation, but the means of the two curves differ by a decidedly significant amount, the future doctors earning an average index higher by 0.51 ($P<0.001$). The correlation of the first term indices of the doctoral group with their cumulative indices is very high (0.86) and appreciably greater than the high correlation value for these two sets of indices for the random sample (0.71), indicating a greater degree of consistency in the records of the superior group.

The second objective was to determine whether the undergraduate records of students who later obtained the doctorate showed any significant differences as related to the particular disciplines in which they obtained the doctorate. When the records were separated into the six fields designated in the report of the Office of Scientific Personnel, no significant difference was noted except in the field of Education. When the individual disciplines were arranged separately in order of descending indices, significant differences were apparent between the extremes of the list. The groupings of subjects by the method of the Office of Scientific Personnel had obscured these differences, e.g., both Mathematics and Geology are included in the field of the Physical Sciences, but the average of students in Mathematics differs appreciably from that of students in Geology.

The average of the cumulative indices of students who later obtained a doctorate in Education differs from that of the non-education group by an amount which is definitely significant (average indices less by 0.47, with $P<0.001$.) The distribution of the indices for the education group is represented by a bimodal curve (Figure 3) with one mode, of a smaller proportion, coinciding with the mode of the non-education group, and a second mode, composed of the majority, coinciding with the mode of the random sample. Webb (4) has found a similar difference among candidates for the Master's degree at Emory University. He reports that non-education students had better undergraduate records and made higher scores on all of a series of tests than did Education students.

Finally it was deemed advisable to consider these results for any criteria which might be applicable to the selection of students who possess the potential for advanced graduate work. Undergraduate records are, of necessity, the only indicator here. Relative attainments within the Graduate School have not been considered and the eventual awarding of the Doctor's degree has been accepted as a single criterion of success in graduate work. Some studies have approached the problem of undergraduate-graduate correlation from the point of view of ratings within the Graduate School. Webb (5) studied graduate students at Emory University, coming from a great variety of undergraduate institutions. He examined the relative merits of 1) undergraduate transcripts, 2) the Cooperative English Test, 3) the Cooperative General Culture Test, and 4) evaluation by the faculty of the Graduate School. The high value of the undergraduate transcripts is evident from his studies, even though his analysis dealt with undergraduates coming from numerous colleges of unlike standards. The undergraduate records examined for this data have been earned in a single institution where faculty appraisal and ratings are probably more homogeneous.

In this survey there is evidence that the cumulative index and even the first term index may be

highly useful as a predictor of degree attainment in Graduate School. Approximately all students who have an index of 3.5 or more in the first term have the potential for high academic achievement, and those with a first term average of 3.0 to 3.4 include a large percentage who are qualified for graduate study. It would appear therefore to be highly advantageous to encourage students in these categories to consider graduate study and to adopt a curriculum in college that will provide better than average stimuli.

Conclusions

The undergraduate records of 294 students from one college who subsequently earned the doctorate were significantly better than those of a comparable random sample from the same classes, both for the first term and for the cumulative average of all their college work.

The correlation between first term grades and the cumulative average is high for both groups, with a coefficient of 0.86 for the doctors and 0.71 for the random sample. There is also significant correlation between high school and college averages for the future doctors with a coefficient of 0.66.

A few students with very poor averages earned the doctorate, including four who had been dropped for poor scholarship and were later reinstated.

Superior students are in almost all cases superior in their first term. Seventy-eight percent of the doctoral group with a first term index of 3.5 completed their college work with a 3.5 index and 92% with a first term index of 3.0 or above completed their work with an index equally high.

There is no significant difference between the college averages of the different fields as defined by the Office of Scientific Personnel, except for Education, in which the average was considerably below that of the other groups with a highly significant difference. The distribution of the undergraduate grades of the Education group fall into a bimodal curve with two modes, one for a larger group the same as that of the random sample and a second mode for a smaller group the same as that of the other doctors.

The grade averages when grouped according to subjects (rather than fields), with the omission of Education, range from a high of 3.61 for Mathematics to a low of 2.81. Analysis of variance indicates that these differences are significant.

The averages of the grades earned in the subject of the future doctorate or a related major are somewhat higher than those of the general average, a tendency which is more marked in the social sciences and the arts and humanities than in the physical sciences and the biological sciences.

The distribution of honors parallels the differences in averages in the different groups, with honors in Education fewer and comparable to the those in the random sample.

For graduates during 1949-50 when both male and female students received degrees, the number of male students obtaining the doctorate by 1956 was far in excess of the number of female students with a ratio of 1 to 26.4 when pro-rated for numbers of male and female graduates.

FOOTNOTES

1. Skewness of doctors as measured for β_1 was found to be 0.125 and skewness of sample was 0.216. For N = 300 both are beyond the 0.02 point. The skewness of each is, therefore, significant.
2. There is a factor of dependence involved in these correlations since the first term grades are included in the cumulative index, but the values are sufficiently high not to abrogate the correlation.
3. Data did not indicate exact degree earned, i. e., Ph.D. or Ed.D.

REFERENCES

1. Croxton, F. E. and Cowden, D. J., Applied General Statistics, Revised Edition, (Englewood Cliffs, New Jersey: Prentice Hall, Inc., 1955).
2. Dixon, W. J. and Massey, F. J., Introduction to Statistical Analysis, (Eugene, Oregon: Private Printing, 1949), pp. 1-5, reprinting Table XXXIII from Ronald A. Fisher and Frank Yates, Statistical Tables for Biological, Agricultural, and Medical Research, (Edinburgh: Oliver and Boyd, 1943).
3. Office of Scientific Personnel, National Academy of Sciences-National Research Council, "Production of U. S. Scientists: Trends in the Number of Doctorates Granted in the Major Fields of Science and in the Humanities," Science, CXXVII (28 March, 1958), pp. 682-685.
4. Webb, S. C., "Predictors of Achievement in Graduate School," Journal of Applied Psychology, XXXV, (August, 1951), pp. 265-271.
5. Webb, S. C., "Differential Prediction of Success in Graduate School," Journal of Educational Research, L, (September, 1956), pp. 45-54.

JOURNAL OF EXPERIMENTAL EDUCATION
(Volume 29, Number 1, September 1960)

SYLLOGISTIC REASONING

GEORGE N. BEAUMARIAGE, Jr.
Sacramento State College
Sacramento, California

REASONING HAS been considered as one of the factors of intelligence by many psychologists. Reasoning in most intelligence tests includes the induction of a rule from several instances and the drawing of conclusions from syllogisms. At times the induction of a rule may appear to be a type of matching and recognition of absurdities. Certain types of reasoning ability are directed toward, and are measured in achievement tests, as for example, understanding. This understanding factor seems to be in reality a type of reasoning ability. Some concept formation tests really measure the ability to choose the answer to a problem.

In the past, measurements of intelligence were more preoccupied with the ability necessary to apply formal logic. The English still seem to demand an ability to handle formal logic as a measure of "intelligence." Actually, in one of our more modern tests of mental maturity and ability, the California Mental Maturity Test, formal logic is found in only one-seventh of the test.

The problem of language has great importance when one considers logic as a measure of reasoning ability. If the test problem measuring logic involves the ability to understand written language, the logic might be obscured by the language ability of the testee.

For the purposes of this paper, syllogistic reasoning will be that ability necessary to logically determine the correct conclusion from a group of facts presented in the form of a syllogism.

The particular form of logic used will be syllogistic reasoning, and will, in effect, be a measure of the subject's ability to do deductive reasoning. Inductive reasoning will not be considered.

To determine the syllogistic reasoning abilities of the subjects, the following syllogisms were used: Those that are found in Part 4 of the California Short Form Test of Mental Maturity, Elementary 1950 S Form; and Sir Cyril Burt's Test No. 29, Graded Reasoning Test, Short List (2). Some changes in the language of the Burt list have been made to conform with American usage since this test was originally designed for English usage. A copy of the Graded Reasoning Tests (Short List) is included in the Appendix.

Some fifty-three pupils were given the California Mental Maturity Test and the Graded Reasoning Test, Short List, by Sir Cyril Burt. The Inference Test from the California Mental Maturity Test was then compared to the Graded Reasoning Test.

The Procedure

The California Mental Maturity Test is a group test. The writer administered this test to four groups of children composed of 4th, 5th, and 6th graders.

Approximately one and one-half hours were spent in administering each of these tests. The results from the testing of fifteen 4th graders are summarized in Table I, of fourteen 5th graders in Table II, and of twenty-four 6th graders in Table III. It is to be noted that these tables record the mental age score in months. The test itself is made up of spatial relationships, two parts of logic reasoning, two parts of numerical reasoning, and two parts of verbal conceptions according to the titles given. For the purposes of this paper the results from Test Four, Inferences, are recorded. This Test consists of fifteen situations that require logical application of deductive reasoning for solution. The test results, in terms of mental age in months, for this test are found in Column 5 of the tables.

Sir Cyril Burt's Test 29, Graded Reasoning Test, Short List, consists of some seventeen items. Starting at a base level of six and one-half years equal to 0 and counting each test correctly solved and explained as one-half year, the test goes to 15 years. Theoretically, a child with an IQ of 100, or average, will correctly answer all of the questions listed beneath his age. Each test is equivalent of one-half year with 0 falling at six and one-half.

This test requires individual examination. The child is required to read the question and may be helped with any and all language difficulties, until

TABLE I

FOURTH GRADE
Mental Age in Months

1	2	3	4	5	6	7	8	9	10	11
Child	CA	Spatial Relations	Logical Reasoning Syl.	Inf.	Numerical Reasoning	Verbal Concepts	Language	Non-Language	Total Mental	B Syl.
1	121	119	132	94	133	120	110	126	116	96
2	131	134	176	168	120	118	126	134	132	156
3	121	134	107	131	133	108	114	123	119	138
4	121	123	155	179	141	134	141	126	135	156
5	123	102	155	101	95	0	0	107	92	102
6	119	158	155	108	132	126	117	150	132	102
7	117	84	132	109	120	108	103	96	102	114
8	133	84	97	180	120	123	127	90	121	162
9	120	120	131	92	130	2	10	122	90	102
10	132	132	170	160	122	118	124	119	121	144
11	118	115	110	130	132	122	118	120	119	138
12	119	131	150	160	138	116	128	130	130	162
13	123	87	148	110	100	130	105	103	104	102
14	122	96	146	120	128	108	110	108	110	108
15	134	86	100	115	115	120	108	110	109	96

TABLE II

FIFTH GRADE
Mental Age in Months

1	2	3	4	5	6	7	8	9	10	11
Child	CA	Spatial Relations	Logical Reasoning Syl.	Inf.	Numerical Reasoning	Verbal Concepts	Language	Non-Language	Total Mental	B Syl.
1	131	123	114	114	96	128	113	118	117	117
2	138	108	175	108	120	125	118	112	116	102
3	136	177	156	122	134	118	101	158	120	114
4	133	195	174	188	102	135	135	162	148	159
5	127	147	156	130	159	135	134	156	142	126
6	125	127	176	130	134	143	136	142	138	132
7	131	168	176	180	166	169	168	167	168	144
8	129	168	174	156	166	142	144	168	150	150
9	138	196	197	174	182	167	170	192	179	156
10	137	178	174	169	166	155	160	162	160	162
11	132	168	155	197	166	166	169	165	168	168
12	138	143	156	122	146	142	140	139	141	108
13	134	155	174	177	155	159	159	158	158	162
14	135	177	175	197	177	166	173	174	175	176

TABLE III

SIXTH GRADE
Mental Age in Months

1	2	3	4	5	6	7	8	9	10	11
Child	CA	Spatial Relations	Logical Reasoning Syl.	Logical Reasoning Inf.	Numerical Reasoning	Verbal Concepts	Language	Non-Language	Total Mental	B Syl.
1	143	176	154	178	147	116	132	160	140	168
2	135	148	156	121	139	152	141	148	144	114
3	157	169	174	177	159	151	156	167	158	174
4	147	176	174	169	158	152	158	162	158	162
5	145	195	174	168	140	146	146	174	153	132
6	147	105	175	186	180	149	165	123	149	176
7	144	107	174	114	159	144	143	114	133	103
8	136	186	156	157	184	146	153	181	165	162
9	145	154	106	114	148	122	116	145	128	102
10	138	140	132	132	172	148	148	139	147	126
11	151	186	175	121	141	112	115	194	136	126
12	140	104	155	123	173	131	138	116	130	114
13	168	186	174	157	160	156	156	164	157	144
14	152	96	177	102	125	132	118	108	114	96
15	145	185	155	143	167	157	155	166	157	150
16	146	98	174	132	156	137	143	108	128	132
17	146	128	174	120	126	160	137	138	138	114
18	143	160	156	144	134	144	144	140	156	138
19	156	123	156	131	158	139	140	132	138	132
20	149	196	174	144	114	148	134	175	148	132
21	156	140	174	108	113	151	133	142	138	114
22	143	124	114	156	134	150	150	114	138	144
23	165	156	132	127	127	128	144	144	138	126
24	150	134	174	168	140	109	128	132	131	162

TABLE IV

FOURTH-GRADE TEST SCORE COMPARISONS

1	2	3	4	5	6
C. A.	Inference	Total Mental	Rank Order Total Mental	B Syllogisms	Rank Order Syllogisms
133	180	121	4	162	1
121	179	135	1	156	2
131	168	132	2	156	2
132	160	121	4	144	3
119	160	130	3	162	1
121	131	119	5	138	4
118	130	119	5	138	4
122	120	110	7	108	6
135	115	109	8	96	8
123	110	104	9	102	7
117	109	102	10	114	5
119	108	132	2	102	7
123	101	92	11	102	7
121	94	116	6	96	8
120	92	90	12	102	7

TABLE V

FIFTH-GRADE TEST SCORE COMPARISONS

1	2	3	4	5	6
C. A.	Inference	Total Mental	Rank Order Total Mental	B Syllogisms	Rank Order Syllogisms
135	197	175	2	176	1
132	197	162	3	168	2
133	188	148	7	159	4
131	180	168	3	144	7
134	177	158	5	162	3
138	174	179	1	156	5
137	169	160	4	162	3
129	156	150	6	150	6
127	130	142	8	126	9
125	130	138	10	132	3
138	122	141	9	108	12
136	122	120	11	114	11
131	114	117	12	117	10
138	108	116	13	102	15

TABLE VI

SIXTH-GRADE TEST SCORE COMPARISONS

1	2	3	4	5	6
C. A.	Inference	Total Mental	Rank Order Total Mental	B Syllogisms	Rank Order Syllogisms
175	186	149	6	176	1
143	178	140	9	168	3
157	177	158	2	174	2
147	169	158	2	162	4
145	168	153	5	132	8
150	168	131	13	162	4
136	157	165	1	162	4
168	157	157	3	144	6
143	156	138	10	144	6
149	144	148	7	132	8
143	144	156	4	138	7
145	143	157	3	150	5
138	132	147	8	126	9
165	132	138	10	126	9
146	132	128	15	132	8
156	131	138	10	132	8
140	123	130	14	114	10
135	121	144	8	114	10
151	121	136	11	126	9
146	120	138	10	114	10
145	114	128	15	102	11
144	114	133	12	102	11
156	108	138	10	114	10
152	102	114	16	96	12

the tester is assured of his success with the language of the question. The subject may read silently if he desires and the tester finds that he can successfully handle the material.

After the child understands the task, he is allowed to think it through. Then he must answer the problem. After he has answered the problem, he is given a score of one. He must then give his reasons for the answer. If his reasoning is faulty, then one-fourth score is deducted for each faulty reason. If the child gives an incorrect answer to the problem, he is asked to try again. After four unsuccessful attempts, he continues to the next problem. After three consecutive problems are missed four times each, the test is finished. A correct answer may be cancelled as far as scoring is concerned by incorrect reasoning. Motivation, approval, and other practices conducive to good rapport between the tester and subject should be practiced.

The writer had each of these seventeen items on a card and gave the cards to the child for him to read. It was necessary to change some words from the original test so that they would more nearly resemble those in common usage in this country. For instance, the word "cleverer" was changed to "smarter", because the children had difficulty with "cleverer." The word "blouse" was changed to "shirt," "walking stick" to "cane," and "cricket" to "ball." Locations such as France, the Scottish Hills, and sea coast were changed to Hawaii, Sierras, and Beach. Some other words that could have given difficulty were not changed because no difficulty was actually incurred. The results of this test are found in Column II in Tables I, II, and III.

According to Sir Cyril Burt, the efficient test for measurement of mental abilities is one that requires logical inference for solution. When the testing situation gives all of the facts required for the solution, thus eliminating special knowledge, empirically that test is the best measure of intelligence available.

Conclusions and Implications

Some fifty-three children were given both the California Mental Maturity Test and the Graded Reasoning Test (Short List). Fifteen fourth graders were tested, fourteen fifth graders, and twenty-four sixth graders.

The test results are found in Tables I, II, and III. Tables IV, V, and VI give some of the scores most appropriate to this study. It is to be noted that these tables are in rank order in terms of months of mental age and include chronological age.

For the fourth-grade scores, the Spearman rank difference correlation, rho, between the syllogism test and the inference test is 0.88.

For the fifth-grade scores, rho is 0.86 between the total and inference scores, and 0.91 between the syllogism and inference scores.

The rank order of the scores for the syllogisms agrees very well with the rank order of the inference scores from the Mental Maturity Test. However, the total mental score from the Mental Maturity Test does not agree as well. Chronological age seems to have even less correlation.

Since the Mental Maturity Test purports to test more than logical reasoning ability, then perhaps these factors do not necessarily correlate with reasoning abilities.

Little significant difference was found in the ability to handle syllogisms between children of grades four and six. The relationship between chronological age and ability to think logically seems to be determined by some sort of intelligence, native or otherwise. Actually, those children who, in general, had the highest score in terms of mental age did the best on the syllogisms.

Language had an effect on ability to handle the syllogisms. Many times the children asked questions concerning pronunciation and meaning of words. Actually, there seemed to be an unwillingness to tackle any unfamiliar word for fear it would be misleading in the solution of the problem. There seemed to be a general attempt to hunt for hidden meanings, and when the children found out they could ask questions they tended to ask more than they actually needed to ask. This slowed down the process and thus much time was required.

When the children gave wrong answers or wrong reasons for their answers, they then began to guess more than when they had success. Guessing seemed to increase with failure. The guessing did not exactly reflect illogical reasoning, it more nearly reflected no reasoning at all. When cautioned, the children seemed to use better logic than when allowed to proceed without any restraint.

A second test equivalent to the Burt test but to be administered as a group test requiring written answers might disclose whether the children really needed all the information they requested. It is felt that the security the children got from the ability to ask questions materially aided them and resulted in slightly higher scores.

In general, there seems little doubt that the syllogism will give an indication of the mental ability of the subject. However, there is another factor (or factors) here—that the writer has too few data to identify correctly.

REFERENCES

1. Anastasi, Anne, and J. P. Foley, Jr. Differential Psychology (New York: Macmillan Co., 1949).
2. Burt, Sir Cyril. Scholastic and Mental Tests (London: Oxford University Press).
3. Cronbach, L. J. Essentials of Psychological Testing (New York: Harper and Bros., 1949).
4. Hilgard, Ernest R. Theories of Learning (New York: Appleton-Century-Crofts, Inc., 1948).
5. Maier, Norman R. F. "Reasoning and Learning," Psychology Review, XXXVIII (1931), pp. 332-46.
6. McGeoch, John A. The Psychology of Human Learning (New York: Longman's Green and Co., 1942).
7. Ross, C. C. Measurement of Today's Schools (New York: Prentice-Hall, 1947).
8. Thouless, R. H. How to Think Straight (New York: Simon and Schuster, 1939).
9. Woodworth, Robert S. Contemporary Schools of Psychology (New York: Ronald Press, 1948).
10. Woodworth, Robert S., and S. B. Sells, "An Atmosphere Effect in Formal Syllogistic Reasoning," Journal of Experimental Psychology, XVIII (1935), pp. 451-60.

APPENDIX

GRADED REASONING TESTS
(Short List)

1. Tom runs faster than Jim;
   Jack runs slower than Jim.
   Which is the slowest of the three?

7 Years

2. Kate is cleverer than May;
   May is cleverer than Jane.
   Who is the cleverest—Jane, Kate, or May?

3. I have bought the following Christmas presents: a pipe, a blouse, some music, a box of cigarettes, a bracelet, a toy engine, a bat, a book, a doll, a walking-stick, and an umbrella.
   My brother is eighteen; he does not smoke, nor play cricket, nor play the piano.
   I want to give the walking-stick to my father, and the umbrella to my mother.
   Which of the above shall I give to my brother?

8 Years

4. I don't like sea voyages;
   And I don't like the seaside.
   I must spend Easter either in France, or among the Scottish Hills, or on the South Coast.
   Which shall it be?

5. The person who stole Brown's purse was neither dark, nor tall, nor clean-shaven.
   The only persons in the room at the time were—
   1) Jones, who is short, dark, and clean-shaven;
   2) Smith, who is fair, short, and bearded;
   3) Grant, who is dark, tall, but not clean-shaven.
   Who stole Brown's purse?

9 Years

6. Three boys are sitting in a row;
Harry is to the left of Willie;
George is to the left of Harry.
Which boy is in the middle?

7. In cold, damp climates, root crops, like potatoes and turnips, grow best;
In temperate climates, there are abundant pastures, and oats and barley flourish;
In sub-tropical climates, wheat, olives, and vines flourish.
The ancient Greeks lived largely on bread, with oil instead of butter; they had wine to drink, and raisins for fruit.
Which climate do you think they had?

10 Years

8. There are four roads here:
I have come from the south and want to go to Melton;
The road to the right leads somewhere else;
Straight ahead it leads only to a farm.
In which direction is Melton—North, South, East, or West?

9. The doctor thinks Violet has caught some illness.
If she has a rash, it is probably chicken pox, measles, or scarlet fever;
If she has been ailing with a cold or cough, she may develop whooping cough, measles or mumps.
She has been sneezing and coughing for some days, and now spots are appearing on her face and arms.
What do you think is the matter with Violet?

11 Years

10. Where the climate is hot, gum trees and rubber will grow;
Heather and grass will grow only where it is cold;
Heather and rubber require plenty of moisture;
Grass and gum trees will grow only in fairly dry regions.
Near the Amazon River it is very hot and very damp.
Which of the above grows there?

11. Father has just come home in a brand new overcoat; there is clay on his boots and flour on his hat.
The only places he can have been to are Northgate, Southgate, Westgate, or the City; and he has not had time to go to more than one of these.
There is no clay anywhere in the streets except where the pavement is up for repair;
There are tailor's shops only in Southgate, Westgate, and the City;
There are flour mills only in Northgate, Westgate, and the City;
I know the roads are not being repaired in the City, though they may be in other places.
Where has father been?

12 Years

12. I started from the church and walked 100 yards;
I turned to the right and walked 50 yards;
I turned to the right again and walked 100 yards.
How far am I from the church?

13. Field mice devour the honey stored by the bumblebees; the honey which they store is the chief food of the bumblebees.
Near towns, there are far more cats than in the open country.
Cats kill all kinds of mice.
Where, then, do you think there are the most bumblebees—in the neighborhood of towns or in the open country?

13 Years

14. A pound of meat should roast for half an hour;
Two pounds of meat should roast for three-quarters of an hour;
Three pounds of meat should roast for one hour;
Eight pounds of meat should roast for two hours and a half.
From this can you discover a simple rule by which you can tell from the weight of a joint for how long it should roast?

15. What conclusions can you draw from the following facts?
Iron nails will not float in a pool;
A cup of pure gold dust weighs nearly twenty times as much as a cup of water of the same size;
If you drop a silver sixpence or a copper coin into a puddle, it will sink to the bottom;
A cubic inch (about a tablespoonful) of water weighs less than half an ounce; a cubic inch of brass weighs over two ounces;
A leaden weight will drop to the bottom of the ocean.
Sum up all these observations in one short statement of the following form:
"Most _____ are _____ _____ _____."

14 Years

16. John said: "I heard my clock strike yesterday, ten minutes before the first gun fired. I did not count the strokes, but I am sure it struck more than once, and I think it struck an odd number."
John was out all morning from the earliest hours; and his clock stopped at five to five the same afternoon.
When do you think the first gun fired?

17. Captain Watts and his son James have been found shot—the father in the chest and the son in the back. Both clearly died instantaneously.
A gun fired close to the person—as, for example, when a man shoots himself—will blacken and even burn the skin or clothes; fired from a greater distance, it will leave no such mark.
The two bodies were found near the middle of a large hall used as a rifle range. Its floor is covered with damp sand, which shows every footprint distinctly. Inside the room there are two pairs of footprints only. A third man standing just outside the door or window could aim at any part of the room, but the pavement outside would show no footmarks.
Under Captain Watts' body was found a gun; no such weapon was found near James.
In each case the coat, where the bullet entered, was blackened with gunpowder, and the cloth a little singed.
Captain Watts was devoted to his son, and would have died sooner than harm him purposely; hence it is impossible to suppose that he killed him deliberately, even in self-defense. But some think that James secretly disliked his father, and hoped to inherit his fortune at his death.
Was Captain Watts' death due to murder, accident, or suicide?
Was James' death due to murder, accident, or suicide?

JOURNAL OF EXPERIMENTAL EDUCATION
(Volume 29, Number 1, September 1960)

ANALYSIS OF ADOLESCENTS' RESPONSES TO THE F SCALE

JACK R. FRYMIER
Auburn University

The Problem

WILL DIFFERENCES in cultural background affect the way adolescents respond to the F scale, a measure of anti-democratic (authoritarian) potential? If there are differences, will they be apparent in total F scale scores? Will differences also be apparent in individual items of the measure? If there are differences, what do they mean?

Christie and Garcia[1]* compared F scale responses of a group of California university students with a college population from a southwestern city. They reported that the scores from the California group were significantly lower and also that the California group accepted 18 of the 30 items to a lesser degree than the other group. Other studies by Prothro and Melikian[2] and Cohn and Carsch[3] indicate that persons living in or coming from an authoritarian culture tend to score higher on the F scale.

The Procedure

To answer the questions posed above, the author administered the F scale in conjunction with other tests[4] to 104 students in a large metropolitan high school in Michigan and a rural consolidated school in Alabama. For the purposes of this study, it was assumed that urban Michigan and rural Alabama constituted different cultural situations. Each student from the Northern urban area was matched with one from the Southern rural area on the bases of age, sex, and grade in school, making 52 pairs in all. The mean age of the two groups was 16.38 years, and each group had 22 girls and 30 boys. These students had all lived in their particular locale for at least ten years and all were Caucasian. In response to preliminary questions about frequency of church attendance during a one-month period, the Northern group mean was 3.74 and the Southern group mean was 4.42 times. The Southern rural group also had more persons who indicated they watched television "very often" while the Northern urban group had a greater number who said they watched television "occasionally."

The responses to the F scale were tabulated in two ways. First, total scores were computed according to the directions of Adorno[5]. Next, agreement or disagreement[6] with the individual items was recorded.

These data were then manipulated statistically several ways. First, mean F scale scores and standard deviations were determined for each group, and the difference between these mean scores was then compared by use of the "t" test. Second, the number in the Southern rural and Northern urban groups who agreed and disagreed on each item was compared by computing chi square. Third, the percent of each group who agreed with each item was determined, and the various items listed in rank order of agreement for both groups. Fourth, these rank orders were compared by inspection. The results of these procedures follow.

The Results

The difference between the mean F scale scores for the Northern urban group (mean of 3.95) and Southern rural group (mean of 5.05) was statistically significant, as shown in Table I. This seems to indicate that there is some factor or factors which may be responsible for a considerable difference between these two groups on this particular measure, the Southern rural group apparently tending to exhibit more anti-democratic (authoritarian) potential than the Northern urban group.

Table II shows a comparison of the Southern rural and Northern urban groups' responses to individual items[7] of the F scale by use of chi square. Since the difference between the groups is statistically significant for 19 of the 27 items, this would seem to indicate that there is considerable difference in the way in which the members of these two cultural groups responded to these particular items of the F scale.

Table III shows the relative rank order for 22 of the 27 items of the F scale for both Northern and Southern groups. Since this ranking was not identical (there was not a perfect correlation for all

*All footnotes will be found at end of article.

TABLE I

COMPARISON OF MEAN SCORES OF SOUTHERN RURAL AND NORTHERN URBAN GROUPS ON F SCALE

Group	Mean	S. D.	"t"
Northern Urban	3. 95	. 620	8. 66*
Southern Rural	5. 05	. 667	

*Difference is significant at the . 001 level of confidence.

TABLE II

COMPARISON OF AGREEMENT AND DISAGREEMENT ON INDIVIDUAL ITEMS OF THE F SCALE FOR SOUTHERN RURAL AND NORTHERN URBAN GROUPS

Item Number[9]	Chi Square
1	. 00
2	7. 08*
3	. 98
4	7. 26*
5	. 34
6	10. 80*
7	. 96
8	10. 04*
9	10. 86*
10	5. 56*
11	12. 48*
12	3. 83
13	5. 63*
14	8. 09*
15	6. 22*
16	6. 19*
17	6. 71*
18	16. 12*
19	1. 46
20	. 96
21	13. 28*
22	9. 96*
23	22. 10*
24	15. 46*
25	3. 02
26	7. 96*
27	17. 71*

*Differences are significant at the . 05 level of confidence.

TABLE III

APPROXIMATE RANK ORDER OF F SCALE ITEMS FOR SOUTHERN RURAL AND NORTHERN URBAN GROUPS ACCORDING TO PROPORTION OF GROUP WHO AGREED WITH EACH ITEM

Item Number[9]	Item	North. Urban Agreement %	South. Rural Agreement %
1	Obedience and respect for authority are the most important virtues children should learn.	98	98
12	Young people sometimes get rebellious ideas, but as they grow up they ought to get over them and settle down.	88	98
2	No weakness or difficulty can hold us back if we have enough will power.	85	98
17	Someday it will probably be shown that astrology can explain a lot of things.	73	92
16	There is hardly anything lower than a person who does not feel a great love, gratitude and respect for his parents.	71	90
3	Science has its place, but there are many things that can never possibly be understood by the human mind.	77	85
8	What youth needs most is strict discipline, rugged determination, and the will to work and fight for family and country.	62	88
14	Sex crimes, such as rape and attacks on children, deserve more than mere imprisonment; such criminals ought to be publicly whipped, or worse.	60	85
25	No sane, normal, decent person could ever think of hurting a close friend or relative.	63	79
21	The wild sex life of the ancient Greeks and Romans was tame compared to the goings-on in this country, even in places where people might least suspect it.	54	86
22	If people would talk less and work more, everybody would be better off.	54	83
4	Human nature being what it is, there will always be war and conflict.	54	79
13	What this country needs most, more than laws and political programs, is a few tireless, courageous, devoted leaders in whom people can put their faith.	56	75

TABLE III (Continued)

Item Number[9]	Item	North. Urban Agreement %	South. Rural Agreement %
9	Nowadays when so many different kinds of people move around and mix together so much, a person has to protect himself especially carefully against catching an infection or disease from them.	50	71
6	When a person has a problem or a worry, it is best for him not to think about it, but to keep busy with more cheerful things.	42	75
7	A person who has bad manners, habits, and breeding can hardly expect to get along with decent people.	52	62
11	Some people are born with an urge to jump from high places.	35	69
20	Most of our social problems would be solved if we could somehow get rid of the immoral, crooked, and feeble-minded people.	44	54
10	An insult to our honor should always be punished.	35	58
15	People can be divided into two distinct classes, the weak and the strong.	23	52
24	The business man and the manufacturer are much more important to society than the artist and the professor.	15	52
26	Nobody ever learned anything really important except through suffering.	19	46

items, this requires some explanation. The author observed that although the proportion of the two groups who agreed with any particular item differed, in general both groups tended to accord approximately the same value to most of the various items as they related to the whole. That is, even though 75% of the Southern rural group agreed with item number 13 and only 56% of the Northern urban group agreed, if the percent of agreement for all of the various items were given a rank order for both groups, both the Southern rural and Northern urban groups accorded this particular item approximately the same relative position, viz., thirteenth. There were some variations in this relative rank order between the groups, but the general pattern seemed to be quite similar. For the purposes of this study, then, it was decided that if the relative position of a particular item did not vary more than four positions from that of the other group, this item was considered to have been accorded approximately the same value by both groups in the overall hierarchy of values which seems to be demonstrated by a complete ranking of all the items.

Table III, then, might be interpreted as giving some general indication of the extent to which these two groups were similar rather than different, as Tables I and II seem to indicate.

Differences greater than four positions in rank order placement were apparent for four of the 27 items. These are shown in Table IV. It should be noted that the relative difference in positions of item 19 for the two groups was not greater than four. There were only two items (numbers 5 and 19), however, on which the Southern rural group indicated less agreement than the Northern urban group, and this exception seemed important.

Discussion of Results

Now, what do all these data mean? Tables I and II seem to indicate that there are differences between the responses of these two cultural groups to the scale. Table III, on the other hand, seems to indicate a rather large area of general agreement, while certain specific differences are illustrated in Table IV.

Several conclusions, some conflicting, seem possible. The Southern rural group may be more authoritarian than the Northern urban group; or, the Southern rural group may be less intelligent or more prejudiced and the Northern urban group more intelligent and less prejudiced. Many persons[8] have pointed out the relationship between F scale scores and intelligence and prejudice. Perhaps all of these conclusions are warranted.

Next, there seem to be certain common values which are reflected in the relative amount of agreement with the individual items of the measure by both the Southern rural and the Northern urban groups, with some disagreement on a few other values. The author is not certain whether this second inference is justifiable or not, and if it is, whether it cancels out part or all of the first conclusion (i.e., regarding authoritarianism and/or intelligence and/or prejudice). It would seem to indicate, however, that the differences between these two groups may not be so great as one might assume from the statistical results, or else that they are of an entirely different nature than might otherwise be supposed.

A further observation might be that children from this particular Southern setting seem to be more reluctant to disagree than the children from the Northern area. Or, said another way, their pattern of responses seems to be one of "agreeing with" rather than "differing from" the test as a whole. There are at least three other important observations one might make from a study of Tables III and IV, however, and these are discussed in more detail below.

First, the general hierarchy of values evident upon inspecting the items in descending order of agreement seems to point out several general, though perhaps inconclusive, tendencies. For example, if one examines both ends of the rank order in Table III he gets the impression that these young people want and like mature assistance and direction, but they also have confidence in themselves and their own potential. Further, they seem to feel that people are important—that everybody counts.

Second, the fact that there is considerable difference in the extent to which both groups agreed with items 18, 23, and 27, (see Table IV), all of which are related to social intercourse in one way or another, seems to point up the fact that the members of this particular Southern rural group may be more distrustful, more afraid, and have less faith in other people than the persons from the Northern urban area. The statistical differences between the groups on these particular items (see Table II) are greater than the differences on any of the other items, too.

Also, items 5 and 19, which were the only two with which the rural group indicated less agreement than the urban group, seem to be related to religious tenents or beliefs. That the Southern rural group tended to give less value to these items than the Northern urban group may be an indication of some rebellion at religion on their part. If this is so, it would not be in keeping with the general pattern which seems to be apparent, i.e., the Southern rural group being more authoritarian. As such it would have to be explained some other way.

Third, an analysis of the responses to individual items according to sex indicates a general pattern of similarity within each of the two cultural groups, with certain exceptions. These exceptions are discussed below.

Northern urban girls agreed more than North-

TABLE IV

F SCALE ITEMS ON WHICH RURAL AND URBAN GROUPS DIFFERED

Item Number[9]	Item	North. Urban Agreement %	South. Rural Agreement %
18	Nowadays more and more people are prying into matters that should remain personal and private.	62	94
23	Most people don't realize how much our lives are controlled by plots being hatched in secret places.	42	86
27	Familiarity breeds contempt.	35	75
5	Every person should have complete faith in some supernatural power whose decisions he obeys without question.	62	56
19	Wars and social troubles may someday be ended by an earthquake or flood that will destroy the whole world.	44	35

ern urban boys on items 3, 5, 14, and 22—those concerned with the limited value of science, faith in the supernatural, punishing sex crimes, and working more and talking less. On the other hand, the boys from this Northern urban area tended to agree more than the girls from there on items 10, 11, 13, 16, and 23—those related to punishing insults, jumping from high places, need for leaders, love for parents, and control of our lives by plots.

Southern rural girls tended to indicate more agreement than boys from that area on items 13 and 16—need for leaders and love for parents. The boys from this particular rural area, however, agreed more on items 6, 7, 14, 15, and 20—keep busy and don't worry, need for good manners, punishing sex crimes, people are weak or strong, and getting rid of immoral people.

These differences can probably be accounted for, in part at least, by the experiences, desires, and hopes which these students projected into their responses. That the Alabama girls disagree more regarding punishment of "sex crimes such as rape" than their counterparts from the city or than the rural boys is one especially interesting example of this idea.

One final question seems to be in order: Is the F scale valid? Employment of the F scale in the conventional manner may point up statistical differences which may or may not be significant otherwise. If values are related to authoritarian potential, and such would seem to be a reasonable assumption, and if ranking items in order of agreement gives any indication of a hierarchy of values, it would appear that one may be able, in certain instances, to demonstrate more areas of agreement in responses to the F scale than disagreement; more similarities in values than differences. Granted, the procedure employed in this study was only a rough approximation of the extent to which these two groups were similar on this matter. It may be that more refined procedures might be developed or employed in future studies. This author feels compelled to express certain reservations about the validity of the F scale as a measure of anti-democratic or authoritarian potential at this point, however. It is admitted that these reservations are more vague than specific, but there seem to be some inconsistencies involved.

Suggested Research

Several interesting problems were raised during the course of this study, but the two which seemed most significant to this writer were as follows: 1) How would persons from a Northern rural area and from a Southern urban area respond to the various items of the F scale? 2) How would those persons who work with adolescents expect high-school students to agree with the various items of the F scale? Stated another way, would teachers or prospective teachers or social workers, for example, accurately perceive adolescents' values?

Summary and Conclusions

Two matched groups of 52 high-school students each from urban Michigan and rural Alabama were administered the F scale. The statistical differences between the two groups on the F scale mean scores and 19 of the individual item scores were significant. Both groups, however, tended to rank 23 of the 27 items in approximately the same relative position, as indicated by the proportion of each group who agreed with the particular item. The four items which were not generally agreed upon seemed to indicate that the Southern rural group expressed more fear and possibly distrust of other people than did the Northern urban group. Further, there also seemed to be some indication of a negative reaction to certain traditional religious ideas on the part of the Southern rural group.

The areas of agreement, however, seemed greater, and generally pointed up the idea that young people from both cultural situations possessed genuine concern for their fellow men coupled with considerable faith in their own ability to get things done. They seemed to want and to expect counsel and assistance, in return for which they were willing to accord a reasonable amount of love and respect for their elders. Expressed in one word, these adolescents seemed to possess that priceless human ingredient—hope.

FOOTNOTES

1. Richard Christie and J. Garcia, "Subcultural Variations in Authoritarian Personality," Journal of Abnormal and Social Psychology, XLVI (October 1951), pp. 457-69.
2. E. T. Prothro and L. Melikian, "The California Public Opinion Scale in an Authoritarian Culture," Public Opinion Quarterly, XVII (Fall 1953), pp. 353-62.
3. T. S. Cohn and H. Carsch, "Administration of the F Scale to a Sample of Germans," Journal of Abnormal and Social Psychology, XLIX (July 1954), p. 471.
4. These other tests were tests of hearing acuity and aural perceptions. See Jack R. Frymier The Relationship of Certain Behavioral Characteristics to Perception, unpublished Ed.D. dissertation, University of Florida, 1957.
5. T. W. Adorno, et al., The Authoritarian Personality (New York: Harper and Brothers, 1950), p. 265.
6. Any item which received a plus mark (+1 +2 +3) was considered as agreement, whereas any item which received a minus mark (-1 -2 -3) was considered as disagreement.

7. For the sake of brevity, items are listed only once. See Tables III and IV for a description of each item.
8. Edwin H. Titus and E. P. Hollander, "The California F Scale in Psychological Research: 1950-1955," Psychological Bulletin, LIV (January 1957), pp. 47-64.
9. Item numbers here refer to the author's numerical order as they were included in the version of the F scale which he used, rather than Adorno's item numbers as they are frequently referred to in the literature.

JOURNAL OF EXPERIMENTAL EDUCATION
(Volume 29, Number 1, September 1960)

COMPARISON OF ACADEMIC ACHIEVEMENT, APTITUDES, AND INTEREST PATTERNS OF TWO-YEAR TECHNICAL STUDENTS AND FOUR-YEAR DEGREE CANDIDATES IN ENGINEERING

LOUIS M. HERMAN and MARTIN L. ZEIGLER
The Pennsylvania State University

THE CURRENT emphasis on engineering as a career has helped produce a bumper crop of applicants for college training in this area. Since the available colleges and universities can handle only a portion of those applying for admission, the problem of proper selection and placement of potential students has become acute. The overall field of engineering is in need of both fully trained engineers prepared to handle complex problems and of technicians prepared to serve as engineering aides.

To meet the demands for this dual level of training, the Pennsylvania State University conducts a four-year engineering curriculum at its main campus and also a two-year technical program at its various centers. The study reported in this paper is an evaluation of the academic achievements, aptitudes, and interests of students within these four- and two-year curriculums. The two purposes of the study are 1) to gain information useful for proper selection and curriculum placement of students interested in engineering and 2) to determine the usefulness of a dual program in engineering.

Subjects and Procedure

Seven hundred and fifty-three freshmen enrolled in the four-year program at the College of Engineering and Architecture at the main campus in the fall of 1956, and 416 freshmen enrolled in the two-year technical program in engineering at the college centers during that same period comprised the two main curriculum groups studied. These numbers represent all students who completed their first semester. (In the remainder of the report, the four-year engineering program will be referred to as curriculum 1, and the two-year technical program as curriculum 2). Members of curriculum 1 and curriculum 2 were categorized into three subgroups called high achievers, low achievers, and withdrawals, according to the following criteria:

1. High achievers--those remaining in their curriculum beyond their first semester and maintaining a grade point average of two or better.[1]*
2. Low achievers--those remaining in their curriculum beyond their first semester, but falling below a grade point average of two.
3. Withdrawals--those who withdrew from their curriculum before their second semester began.

Aptitudes of the various subgroups were compared, using the Pennsylvania State University Academic Aptitude Examination (2). Subtests compared on this examination were the arithmetic and algebra sections and a four-part total consisting of a summation of scores on these two previous sections plus scores on the vocabulary and paragraph reading sections.

Interests of the various subgroups were compared with 24 occupations or groups of occupations on the Strong Vocational Interest Blank for Men.[2] Both the ability test and the interest test were administered when the students first enrolled at the university, before any course work was undertaken.

Results and Discussion

Achievements. The numerical and percentage breakdown of students in the two curriculum groups into the three subgroups is shown in Table I. The overall chi-square value of 22.67 for differences in distribution of students among the subgroups of the curriculums was significant at better than the .001 level. The percentage difference between curriculum 1 high achievers and curriculum 2 high achievers was not significant ($CR = 1.23$, $p < .20$). There were, though, a significantly greater percentage of low achievers in curriculum 2 than in curriculum 1 ($CR = 2.39$,

*Footnotes will be found at the end of the article.

TABLE I

THE NUMBER AND PERCENTAGE OF HIGH ACHIEVERS, LOW ACHIEVERS, AND WITHDRAWALS IN CURRICULUM 1 AND IN CURRICULUM 2

Group	High Achievers		Low Achievers		Withdrawals	
	Number	Percent	Number	Percent	Number	Percent
Curriculum 1	394	52.3	210	27.9	149	19.8
Curriculum 2	233	56.0	144	34.6	39	9.4

$p < .02$), but a significantly greater percent of withdrawals in curriculum 1 than in curriculum 2 ($CR = 4.24$, $p < .001$). Apparently then, the percentage of clear-cut success in both groups is about equal, but students in curriculum 1 tend to drop out of the program to a greater degree than students in curriculum 2. The greater percentage of students remaining in curriculum 2 probably accounts for the greater percentage of low achievers in this group than in curriculum 1.

Aptitudes. Table II compares the mean scores obtained on the aptitude subtests by the various subgroups. It is seen that in every case curriculum 1 subgroups achieved higher mean scores than the corresponding curriculum 2 subgroups. Since there were nine comparisons, the probability of such an event occurring by chance is $(1/2)^9$ or less than .002. It is also seen that the lower mean score obtained by any curriculum 1 subgroup exceeds the highest mean score obtained by any curriculum 2 subgroup. Clearly then, curriculum 1 students manifest greater abilities as measured by these tests than do curriculum 2 students.

Comparisons of scores on the four-part total of the aptitude test were made within subgroups of curriculum 1 and within subgroups of curriculum 2. For curriculum 1, an analysis of variance showed an overall significant difference between subgroups ($F = 25.77$, $p < .001$). Subsequent critical ratio tests for significance of differences between any two subgroups showed that the high achievers earned a significantly higher test score than either the low achievers or the withdrawals ($p < .001$); differences between the low achievers and the withdrawals, however, were not significant.

Similar results were obtained within curriculum 2. An analysis of variance showed an overall significant difference between subgroups ($F = 52.41$, $p < .001$), and subsequent critical ratio tests revealed that high achievers exceeded at the .001 level of significance the test scores of both the low achievers and the withdrawals. Again, differences in test scores between the low achievers and the withdrawals were not significant.

It may be surmised from these findings that the differences in grades attained by the subgroups or their decision to withdraw may reflect differences in basic abilities. Within a curriculum group, the students withdrawing and the low achievers seem to have about equal abilities, but the high achievers are clearly superior to both. In a previous study by Guthrie (1), a correlation of .49 was found for four-year engineering students between scores on the four-part total of the ability test and grade-point averages. Although no correlational study was made on two-year technical students, it is quite probable that a similar relationship exists within that curriculum. It would seem likely then, that many of the curriculum 1 low achievers and withdrawals might achieve high grade-point averages within curriculum 2. On the other hand, it is probable that the majority of curriculum 2 high achievers would not achieve similarly high grade-point averages in curriculum 1.

Interests. The Strong Vocational Interest Test yields interest scores which can be expressed in letter grades of A, B+, B, B-, C+, C, and C-; respectively, these grades can be considered to range from indications of interests very close to the majority of people already engaged in a particular occupation to indications of interests quite dissimilar to the majority of people in that occupation. According to Strong's viewpoint that "when hiring a man for a position, it is recommended that he be considered to have passed the interest test for that occupation if he obtains an A or a B+ rating..."(3, pp. 3-4), there were only five areas out of the 24 examined in which any subgroup "passed" the interest test of an occupation.

These five areas were chemist, engineer, mathematics-science teacher, farmer and occupational group II (a composite of the first two areas). In both the chemist and the engineer categories, only the high and low achievers in curriculum 1 and the high achievers in curriculum 2 passed the interest tests. In the mathematics-science teacher category, these same three groups passed plus the withdrawals in curriculum 1. All subgroups passed the interest tests in the farmer category and in the group II composite. It seems then, that there is some tendency for achievement in the curriculums and interest in engineering and chemistry to go together, and to a somewhat lesser extent, for achievement and interest in teaching mathematics and science to go together. Where interests differentiate then, the distinction seems to be more on the basis of degree of academic success than on curriculums.

Table III shows the degree of similarity of interests of all subgroup comparisons. In the body of the table are shown the number of interest areas of the 24 measured in which two compared subgroups received identical median letter grades. The rows show the number of identical median letter grades and the columns under which the two numbers in a row are located indicate the two subgroups being compared. Thus, it is seen at the top of the table body, for example, that there were 20 out of 24 interest areas in which curriculum 1 high achievers and curriculum 1 low achievers received identical median letter grades and, at the bottom of the table, that there were nine interest areas out of 24 in which curriculum 1 low achievers and curriculum 2 low achievers received identical median letter grades.

In considering possible transfer of students between curriculums, the important findings revealed by the table are that curriculum 1 low achiev-

TABLE II

COMPARISON OF MEAN SCORES ON THE ABILITY TEST OF STUDENTS IN CURRICULUM 1 AND STUDENTS IN CURRICULUM 2

Subgroup and Test Section	Curriculum 1 Mean	Curriculum 1 S.D.	Curriculum 2 Mean	Curriculum 2 S.D.
High Achievers				
Arithmetic	24.99	4.03	19.50	4.25
Algebra	28.62	3.14	19.87	6.56
Four-Part Total	140.46	21.61	112.95	22.86
Low Achievers				
Arithmetic	22.14	4.17	15.68	4.14
Algebra	26.46	3.55	15.98	5.77
Four-Part Total	127.50	20.03	92.76	20.35
Withdrawals				
Arithmetic	22.09	4.80	16.86	5.18
Algebra	26.03	4.24	15.95	5.76
Four-Part Total	124.85	21.58	98.00	22.90

TABLE III

THE NUMBER OF INTEREST AREAS OF THE TWENTY-FOUR MEASURED IN WHICH THE VARIOUS PAIRED SUBGROUPS OBTAINED IDENTICAL MEDIAN LETTER GRADES

Curriculum 1			Curriculum 2		
High Achievers	Low Achievers	Withdrawals	High Achievers	Low Achievers	Withdrawals
20	20				
		18			18
		17		17	
				17	17
16			16		
	16		16		
		16	16		
			15		15
			14	14	
	12				12
11				11	
11					11
	11	11			
9		9			
	9			9	

ers are quite similar in interest to curriculum 1 high achievers, and to a somewhat lesser extent, to curriculum 2 high achievers. On the basis of interest then, curriculum 1 low achievers would probably adapt well enough within curriculum 2.

The curriculum 1 withdrawals are most like the curriculum 2 low achievers and curriculum 2 withdrawals. It is possible then, that if these latter two groups are disinterested in curriculum 2 (as evidenced by withdrawal or substandard achievement), the curriculum 1 withdrawals might also be disinterested. It should be noted though, that these curriculum 1 withdrawals are still fairly similar in interests to the high achievers in curriculum 2, so that some basis exists for believing that this group also might adapt well within curriculum 2.

The curriculum 2 high achievers exhibit interest patterns more similar to groups in curriculum 1 than to groups in curriculum 2. It might be expected then, that they might adapt well within curriculum 1.

On the basis of the assumption that interest patterns and success in a curriculum tend to go together, one might approve curriculum 1 low achievers transferring to curriculum 2 and with somewhat less confidence approve curriculum 1 withdrawals transferring to curriculum 2. Curriculum 2 high achievers might be approved to transfer to curriculum 1, although this too would be a somewhat tenuous approval.

Considering both abilities and interests, it seems probable that curriculum 1 low achievers would perform well and adjust adequately in curriculum 2. Curriculum 1 withdrawals would also be capable of performing well in curriculum 2, but the degree to which they might adjust adequately to the program is less certain. Finally, curriculum 2 high achievers would probably not be able to perform well in curriculum 1 because of lack of ability, although their interest patterns seem compatible with the program. It would seem desirable in these latter cases, for the purposes of effective selection, to consider transfers on an individual basis rather than on a group basis. The possibility of any success within curriculum 1 for curriculum 2 low achievers and withdrawals seems very remote.

Summary and Conclusions

Students enrolling in 1956 in the four-year engineering curriculum (called curriculum 1) at the Penn State main campus, were compared in academic achievement, aptitude, and interests to students enrolling at that same time in the two-year technical program in engineering at the university centers (called curriculum 2). It was found that the percentage of students within each curriculum exhibiting clear-cut academic success in their first semester was about the same. There was a significantly greater percentage of students withdrawing from curriculum 1, however. When members of each curriculum were categorized according to grade point average of two or above (high achievers), grade point average below two (low achievers), and withdrawal from the university, it was found that the lowest mean scores in ability tests obtained by any curriculum 1 subgroup exceeded the highest mean score obtained by any curriculum 2 subgroup. Furthermore, degree of success within a curriculum and ability scores seemed to be directly related.

When interests were considered according to the same categorizations, it was found that interests and degree of success seemed to be more related than interests and curriculum. The high achievers in both curriculums generally exhibited stronger interests in engineering and chemistry, than did either the low achievers or the withdrawals. Only five occupational areas were found, out of a total of 24 measured, in which any subgroup exhibited similar interests to people engaged in an occupation. These were engineering, chemistry, farmer, mathematics-science teacher and a composite area, group II.

It is felt that many of the high achievers in curriculum 2 probably would not fare so well academically within curriculum 1 because of lesser abilities, although their interests are like high achievers in curriculum 1. On the other hand, many of the curriculum 1 low achievers and possibly the cirriculum 1 withdrawals might do quite well within curriculum 2. The interests of the curriculum 1 low achievers seem more clearly pertinent to pursuit of an engineering career than do the interests of the curriculum 1 withdrawals, however. Accordingly it would seem wise to consider the merits of the individual case before recommending that a student withdrawing from the four-year curriculum pursue a two-year program.

FOOTNOTES

1. Grade Point Averages were computed by multiplying the number of credits for the course by the numerical value for the letter grade, where A = 4, B = 3, C = 2, D = 1, F = 0, and dividing by the total number of credits.

2. The 24 occupational categories and groups of categories were: medical, architecture, artist, group II (mathematics, engineer, chemist), farmer, math-science teacher, forest service, group V (YMCA physical director, personnel manager, social science teacher, minister), and group VIII (accountant, office man), group IX (life insurance), group X (advertiser, lawyer), and musician.

REFERENCES

1. Guthrie, L. T., Prediction of Academic Success for Freshmen at the Pennsylvania State College. Unpublished master's thesis, Pennsylvania State University, 1952.
2. Moore, B. F., and Castore, G. F. The Pennsylvania State University Academic Aptitude Examination. University Park, Pennsylvania: The Pennsylvania State University, 1947.
3. Strong, E. K., Manual for Vocational Interest Blank for Men. Stanford: Stanford University Press, 1951.

JOURNAL OF EXPERIMENTAL EDUCATION
(Volume 29, Number 1, September 1960)

AN OBJECTIVE AND EMPIRICAL STUDY OF THE EFFECTS OF LABORATORY EXPERIENCE IN A PROFESSIONAL EDUCATION COURSE PRIOR TO STUDENT TEACHING

DAN COX
Southern Illinois University, Carbondale, Illinois

"FIRST OF ALL the teacher's attitude will limit in a very real way her progress in learning to teach. It will determine the kinds of modifications that she is willing to attempt in her teaching, the energy with which the charges are pursued, and the learning that takes place (1)."

The attitude of the prospective teacher would seem to loom as a vital determinant in predicting the success of a teacher as attested by the foregoing statement.

Considerable research has been done to measure the effect of student teaching upon the attitude of teaching candidates during student teaching. These reports indicate that student teaching is probably in many respects the most important single course in the professional preparation of teachers. Since student teaching is largely a laboratory-type course and so significant in the education of teachers, it appears then that pre-student teaching courses with laboratory experiences would also improve a teacher's preparation. Therefore, the purpose of this research is to determine attitudinal changes of teaching candidates that resulted from laboratory experiences when these experiences are a feature of a pre-student teaching course, Human Growth and Development.

The Problem

Do the attitudes of prospective teachers change as a result of professional laboratory experience prior to student teaching? The aim is twofold: 1) to determine the direction and extent of changes of attitude toward children during the period of experimentation as measured by the Minnesota Teacher Attitude Inventory, and 2) to ascertain the relationship between these objectively measured attitudes and empirically measured appraisals as determined by the prospective teachers.

Sources of Data

The sample for this study was drawn from juniors and seniors at a southwestern state teachers college who were enrolled in a professional education course, Human Growth and Development. The majority of the students were between 20 and 22 years of age at the time of the study. One hundred and twenty-two cases were included in this study. The attitudes of the prospective teachers toward school work and toward pupils were measured objectively by the use of the Minnesota Teachers Attitude Inventory (MTAI) and the empirical device of personal appraisal was used.

Procedure

Objective Measure. The MTAI was administered to all students enrolled in the course, Human Growth and Development, at the beginning and again at the end of the course. The students were told that the MTAI scores would be kept in confidence and would not be used in grading. The students were randomly divided into control and experimental groups. The members of the experimental groups were assigned to children and youth organizations of the community. Each student worked with his group for a period of nine consecutive weeks. Organizations to which members of the experimental group were assigned were: Boy and Girl Scouts, Cub and Brownie Scouts, De Molay, Rainbow Girls, Saturday Morning Study Hour and Saturday Morning Playground. The members of the experimental group had course instruction plus the laboratory feature. The members of the control group received only the course of instruction. All sections of the class contained members from both control and experimental groups.*

Table I is a summary of significance of the

*Footnotes will be found at the end of the article.

TABLE I

A SUMMARY OF SIGNIFICANCE OF THE DIFFERENCES BETWEEN THE EXPERIMENTAL AND CONTROL GROUPS FROM PRE-TEST TO POST-TEST FOR FALL AND SPRING SEMESTERS ON TEST OF MINNESOTA TEACHER ATTITUDE INVENTORY

Group	Mean	S.D.	S.E. of Mean	S.E. Dif. of Means	t	t.01	t.05	Null Hyp.
Fall Exp.								
Pre-Test	29.18	28.95	4.64	3.37	6.98	2.71	2.02	Rej. at .01
Post-Test	52.70	31.61	5.07					
Fall Control								
Pre-Test	21.85	34.70	5.56	4.15	5.18	2.71	2.01	Rej. at .01
Post-Test	43.35	35.70	5.72					Rej. at .05
Spring Exp.								
Pre-Test	34.71	29.90	6.69	9.14	5.73	2.84	2.09	Rej. at .01
Post-Test	55.05	27.85	6.23					
Spring Control								
Pre-Test	28.00	33.60	5.52	9.08	8.99	2.84	2.09	Rej. at .01
Post-Test	50.71	32.25	7.21					

TABLE II

TEST OF SIGNIFICANCE BETWEEN GAINS OF EXPERIMENTAL AND CONTROL GROUPS OF FALL SEMESTER ON MINNESOTA TEACHER ATTITUDE INVENTORY

Student No.	Experimental Gain ge	Control Gain ge	Student No.	Experimental Gain ge	Control Gain ge
1	5	2	21	21	36
2	22	17	22	14	-1
3	9	23	23	77	21
4	21	6	24	19	47
5	-17	24	25	18	20
6	29	12	26	24	23
7	57	68	27	28	25
8	12	45	28	14	38
9	-2	56	29	-12	35
10	-12	-15	30	27	36
11	36	18	31	0	13
12	31	52	32	45	-9
13	36	61	33	41	-7
14	27	53	34	73	44
15	33	1	35	17	7
16	16	-7	36	44	16
17	24	25	37	34	-10
18	14	-22	38	28	47
19	24	8	39	-21	12
20	51	49	40	36	57

Mge = 23.58 σge = 21.00 σMge = 3.37
Mgc = 23.15 σgc = 22.93 σMgc = 3.71

t = .086

TABLE III

TEST OF SIGNIFICANCE BETWEEN GAINS OF EXPERIMENTAL AND CONTROL GROUPS OF SPRING SEMESTER ON MINNESOTA TEACHER ATTITUDE INVENTORY

Student No.	Experimental Gain ge	Control Gain ge
1	32	0
2	-10	8
3	36	42
4	13	-11
5	35	-2
6	23	6
7	7	37
8	39	13
9	29	9
10	9	25
11	42	50
12	-7	11
13	13	35
14	41	30
15	28	55
16	44	29
17	33	34
18	10	33
19	-21	39
20	-17	28
21	48	6

Experimental gain = 427 Control gain = 477

Mge = 20.33 σge = 20.5 σMge = 4.59
Mgc = 22.71 σgc = 17.72 σMgc = 3.96
t = .39

differences for the experimental and control groups from pre-test to post-test for the fall and spring semesters.

Table I indicates that both experimental and both control groups made statistically significant gains during the experimental period. The null hypothesis was rejected by all four groups at the .01 level of confidence. Therefore, it is assumed that this change in attitude can be attributed to the instruction.

Attitudinal Changes of Experimental Groups as Compared with Corresponding Control Groups

Objective Measure. Fall Semester. These data are treated in terms of mean gains. Table II compares the fall semester experimental group with the corresponding control group. The experimental group achieved a mean gain of 23.58 points on the MTAI from pre-test to post-test. The corresponding control group made a mean gain of 23.15. The experimental gain S. D. was 21. The control gain S.D. was 22.93. The S.E. of the mean gain of the control group was 3.71. The "t" test resulted in ratio of .086. Therefore, the significance of the experimental group over the control group was not significant at the .01 level of confidence.

Spring Semester. Table III reveals the results of the test of significance between the control and experimental groups for the spring semester. The results are based upon the gain scores made by the groups as a whole and are the results of the pre-test and post-test of the MTAI One may observe that the experimental group--the group whose members were assigned to professional laboratory experiences--earned a mean gain of 22.71. In an attempt to determine the significance of the differences between these two groups, it was found to be .39. This difference is not significant at either the .01 or the .05 level of confidence.

Empirical Measure. The students of the experimental groups completed a form with the following directions: "Describe your reactions to your experiences which you have had this semester in your work with your community activity assignment. Try to relate your remarks to your knowledge and understanding of boys and girls. It is not necessary that you sign your name." The participants were told that the written accounts they were about to prepare would not be read for a number of weeks and that the accounts were an attempt to evaluate the program.

The major purpose for asking for this type of information was so that the conclusions might be compared with the results of the objective measure mentioned above.

These subjective accounts were completed and gathered. Later they were read and in respect to subjective evaluation, it should be remembered that it is the total effect of the answers which are important rather than the specific aspects considered singly.

Sims (2) method was used for classifying the subjective accounts.

The participants of the study indicated that there was considerable personal value in their laboratory experiences. The extent of the value was varied. All the subjects did not find the greatest value in the same area. Several pointed out that the laboratory activity gave meaning to the theory discussed in class. Others seemed to feel that the actual experience of working with youngsters helped them to establish their present ability as a guide of children. Others pointed out that the experiences helped them to understand children and mentioned their enthusiasm for more work with children and youth.

Conclusions

The following conclusions were drawn from the data which were presented in this study:

Objective Instrument

1. The gain from pre-test to post-test was significant at the .01 percent level of confidence for all groups.
2. The experimental groups did not show a statistically significant gain over the corresponding control groups.

Empirical Instrument

1. The empirical measure strongly indicated the value of professional experience prior to student teaching in the preparation of teachers when the experiences are a requirement for a course related to human growth and development.

Empirical evidence strongly supports the thesis that the attitudes of prospective teachers toward teaching can be improved as a result of a professional education course, Human Growth and Development. The objective evidence did not support empirical evidence.

REFERENCES

1. Barr, A. S., and Rippen, N. D., "The Attitude of Teachers Toward Supervision," Journal of Experimental Education, June, 1935, p. 237.
2. Sims, V. M., "The Objectivity, Reliability, and Validity of an Essay Examination Graded by Rating," Journal of Educational Research, Vol. 24, October, 1931, pp. 216-223.

TABLE IV

SUMMARY OF THE DISTRIBUTION OF PARTICIPANTS' SUBJECTIVE ACCOUNTS AS TO THE VALUE OF THEIR LABORATORY EXPERIENCES

Group	Classification	Number	Percent
I	Superior Report	35	57.37
II	Average Report	24	39.34
III	Inferior Report	2	3.28
Total		61	99.99

FOOTNOTE

The author has chosen to use a cluster sample rather than a random sampling technique because of class size and time. It is believed that generalizations from this group's results to succeeding classes at this college can be made from the results of this experiment, hence inferential statistics are used in the treatment of the data here presented.

The students who participated in the experiment were not matched into pairs; therefore, the following formula was used to determine the effect of professional laboratory experiences upon their attitude toward teaching. The formula,

$$t = \frac{Mx - My}{\sqrt{\sigma_2 Mx + \sigma_2 My - 2r\,xy\,\sigma Mx\,\sigma My}}$$

was applied to the results of the MTAI which was used as the objective measure in this study. The above formula established the significance of the difference of means for pre-test to post-test for each group. It was then necessary to compare each experimental group's performance with the corresponding control group's performance for the data. For these data, the following formula was used:

$$t = \frac{Mge - Mgc}{\sqrt{\sigma_2 Mge + \sigma_2 Mgc}}.$$

The "t" obtained was interpreted in terms of the desired level of confidence (.01) through reference to Fisher's special table of "t".

JOURNAL OF EXPERIMENTAL EDUCATION
(Volume 29, Number 1, September 1960)

A COMPARISON OF THREE WAYS OF PHRASING LIKERT-TYPE ATTITUDE ITEMS*

WILLARD E. NORTH
JOHN SCHMID**
University of Arkansas

Introduction

A NUMBER of years ago, Rundquist and Sletto (2) found that the phrasing of questions in attitude and personality scales affected the nature of responses. Their results suggested that reconsideration of the phraseology of items used in the Air Force for assessing job satisfaction was in order.

Examination of the attitude items revealed several inconsistencies in item phraseology. Of those variations detected, two types predominated. It was noted that some items were stated with a personal orientation for the respondee, while others were stated with an impersonal orientation. The second inconsistency in item construction was that some items contained a qualifying phrase while others did not.

As examples of how an attitude item might be stated with either a personal or impersonal orientation, consider the following two items: 1) "My supervisor is excellent;" and 2) "Air Force supervisors are excellent." In responding to the first item, the subject is required to consider only his own supervisor, while the second item requires the subject to consider the Air Force supervisors in general.

Examples of the second type of variation, i.e., items with and without qualifying phrases are given by the following two items: "My supervisor is excellent;" and "My supervisor is better than any other supervisor I might have had." The first item requires the respondee to agree or disagree with the statement about the categorical excellence of his supervisor. The second item permits the respondee to have a qualification built into his response. He must agree or disagree with the statement on the relative excellence of his supervisor when compared with other supervisors, but the subject need not give his supervisor his unqualified endorsement. Thus, it may be seen that a proposition intended to serve as an attitude item might be phrased in at least four ways as shown in the following example:

	Unqualified	Qualified
Personalized	My supervisor is excellent	My supervisor is better than other supervisors I might have had.
Impersonalized	Air Force supervisors are excellent.	Air Force supervisors are better than those found in civilian life.

Question was raised about the effect of the type of phrasing upon statistical characteristics, such as internal consistency, test-retest reliability, and independence of attitude areas. Because of the youthfulness of the airmen subjects, the Impersonalized-Qualified type of items were dropped from the study. The majority of subjects would have had very little opportunity to compare the Air Force job environment with that found in civilian life.

Hypotheses

Three hypotheses were developed, one for each of the three statistical characteristics to be examined in this study.

Hypothesis I: Personalized-Qualified items will produce the most internally consistent scales; Personalized-Unqualified items will produce less

* This investigation was carried out under the Air Force Personnel and Training Research Center in support of Project No. 7950. Permission is granted for reproduction, translation, publication, and use or disposal in whole or in part by or for the United States Government.

**Both authors were with the Personnel Laboratory, WADC, when this study was conducted.

internally consistent scales; and Impersonalized-Unqualified items will yield the least internally consistent scales.

Hypothesis II: Personalized-Qualified items will produce scales with the highest test-retest reliability; Personalized-Unqualified items will produce scales that are less reliable; and Impersonalized-Unqualified items will yield scales with the lest test-retest reliability.

Hypothesis III: Impersonalized-Unqualified type items will demonstrate the highest inter-area correlations when measures on several attitude areas are obtained. Personalized-Unqualified type items will produce the second highest inter-area correlations. Personalized-Qualified type items will yield the lowest inter-area correlations. Low inter-area correlations are, of course, deemed important for diagnosticity.

Procedure

For this study five areas of job satisfaction or attitude derived from a previous factor analysis study were used (3). These were designated as: Supervisors, Air Force Bureaucracy, Co-workers, Living Conditions, and Job. For each of these five areas of job satisfaction, five-item scales representing the three types of item structure were developed. The same basic five items were used for each of the three scales, but were modified so that one scale contained the items written in a personalized-qualified fashion; a second scale contained the same items written in a personalized-unqualified fashion; and the third scale contained these items written in an impersonalized-unqualified fashion.

The above procedure resulted in a total of 75 items. In order to control for possible order effect, the items were partially randomized in such a fashion that each 15-item segment contained an item representing each of the three-item types from each of the five areas; i. e., each of the five areas of job satisfaction was measured by five items written with the personalized-qualified phraseology, five items written with the personalized-unqualified phraseology, and five items written with the impersonalized-unqualified phraseology. Items were assigned to each segment of the survey using a table of random numbers. A table of random numbers was also used to order the fifteen items within each segment. Making use of this partial randomization procedure, two forms were prepared. The only difference in the two forms was the order of item presentation. One form was labeled A; the other form was labeled B.

A total of 199 subjects was obtained. The subjects were enlisted personnel from one Strategic Air Command Air Force Base who were attending a two-week indoctrination school. Form A of the survey was administered on the first day of the school and Form B administered on the last day. A standard five response IBM answer sheet was used. The subjects were instructed to mark A if they strongly agreed with the statement, B if they agreed, C if they were uncertain, D if they disagreed, and E if they strongly disagreed.

It was decided to score item responses dichotomously rather than use the five-point scale. The strongly-agree and agree responses were combined and the disagree and strongly-disagree responses were also combined. The neutral or uncertain response was assigned to the unfavorable-attitude side of the dichotomy. The total score for each of the five scales was the number of favorable responses. Each scale, therefore, had a possible range of zero through five.

Results

Scale Means and Standard Deviations— The scale means are presented in Table I. Although it is not necessary to examine the means for evaluation of the three hypotheses, a rather interesting result does occur. For five areas, the subjects responded more favorably when using the Personalized-Unqualified item type than when using the other two. When scales, using the Personalized-Qualified and Impersonalized-Unqualified item types are compared, no consistent results are observed.

The scale standard deviations are presented in Table II. The standard deviations tend to be somewhat larger for the Personalized item types than for the Impersonalized item types. Between the two Personalized item types the differences are quite small and a number of inversions may be noted. Thus it would appear that any differences found in reliabilities for the different item type scales are probably attributable to factors other than differences in standard deviations.

Internal Consistency—Hypothesis I states that the Personalized-Qualified type of item would have the highest internal consistency and Personalized-Unqualified and Impersonalized-Unqualified item types would be decreasingly internally consistent in that order. To determine the consistency of each scale, the Kuder-Richardson Formula 20 was used. These results are presented in Table III.

It is seen that the Impersonalized-Unqualified item type scales have lowest internal consistency with the exception of Form A of the Job area. In the other four areas there appears to be no differences between the Personalized-Qualified and Personalized-Unqualified items. It appears that the data only partially supports Hypothesis I.

Test-Retest Reliabilities—Hypothesis II states that the Personalized-Qualified item type would demonstrate the highest test-retest reliability and that the Personalized-Unqualified and the Impersonalized-Unqualified item types would show decreasing reliabilities in that order. The Person-

TABLE I

JOB SATISFACTION SCALE MEANS BY AREA AND ITEM TYPE

Item Type	Supervisor		Air Force Bureaucracy		Co-workers		Living Conditions		Job	
	A*	B**	A	B	A	B	A	B	A	B
Personalized-Qualified	2.46	2.40	2.15	2.16	3.40	3.41	1.09	.91	2.72	2.83
Personalized-Unqualified	3.29	3.26	2.70	2.60	3.77	3.80	1.80	1.50	3.60	3.62
Impersonalized-Unqualified	2.70	2.89	2.11	2.31	2.72	3.03	1.29	1.00	3.30	3.53

* Initial Test
**Retest

TABLE II

JOB SATISFACTION SCALE STANDARD DEVIATIONS BY AREA AND ITEM TYPE

Item Type	Supervisor		Air Force Bureaucracy		Co-workers		Living Conditions		Job	
	A*	B**	A	B	A	B	A	B	A	B
Personalized-Qualified	1.78	1.87	1.83	2.03	1.68	1.69	1.38	1.40	1.54	1.54
Personalized-Unqualified	1.75	1.66	1.86	2.01	1.61	1.84	1.58	1.64	1.57	1.53
Impersonalized-Unqualified	1.17	1.18	1.73	1.91	1.63	1.75	1.32	1.28	1.58	1.44

* Initial Test
**Retest

TABLE III

INTERNAL CONSISTENCY OF JOB SATISFACTION SCALES BY AREA AND ITEM TYPE (KR 20)

Item Type	Supervisor		Air Force Bureaucracy		Co-workers		Living Conditions		Job	
	A*	B**	A	B	A	B	A	B	A	B
Personalized-Qualified	.781	.831	.807	.881	.796	.853	.697	.775	.642	.651
Personalized-Unqualified	.814	.784	.811	.873	.808	.861	.708	.775	.756	.743
Impersonalized-Unqualified	.509	.510	.777	.840	.714	.807	.594	.674	.711	.684

* Initial Test
**Retest

TABLE IV

TEST-RETEST RELIABILITIES OF JOB SATISFACTION SCALES BY AREA AND ITEM TYPE

Item Type	Supervisor	Air Force Bureaucracy	Co-workers	Living Conditions	Job
Personalized-Qualified	.781	.726	.773	.735	.711
Personalized-Unqualified	.787	.665	.778	.661	.684
Impersonalized-Unqualified	.577	.657	.668	.630	.648

TABLE V

INTERCORRELATIONS FOR THE FIVE JOB SATISFACTION AREAS

Area	Item Type	Initial Test					Retest				
		Super-visor	Air Force Bureauc-racy	Co-workers	Living Con-ditions	Job	Super-visor	Air Force Bureauc-racy	Co-workers	Living Con-ditions	Job
Supervisor	Pers. -Qual.		154	230	229	155	781	162	249	089	163
	Pers. -Unqual.		276	301	155	242	787	211	305	159	194
	Impers. -Unqual.		438	351	239	410	577	358	257	201	361
Air Force Bureaucracy	Pers. -Qual.			-008	122	146	173	726	047	170	147
	Pers. -Unqual.			144	187	274	218	665	064	253	221
	Impers. -Unqual.			193	147	359	322	657	080	220	341
Co-workers	Pers. -Qual.				318	287	225	-001	773	156	197
	Pers. -Unqual.				138	334	311	104	778	122	252
	Impers. -Unqual.				263	420	337	212	668	241	450
Living Conditions	Pers. -Qual.					126	224	107	287	735	090
	Pers. -Unqual.					086	115	245	137	661	052
	Impers. -Unqual.					177	181	121	172	630	154
Job	Pers. -Qual.						195	122	247	109	711
	Pers. -Unqual.						219	185	280	119	684
	Impers. -Unqual.						419	323	411	156	648
Supervisor	Pers. -Qual.							251	286	098	170
	Pers. -Unqual.							237	311	140	189
	Impers. -Unqual.							367	292	185	457
Air Force Bureaucracy	Pers. -Qual.								009	152	169
	Pers. -Unqual.								080	197	251
	Impers. -Unqual.								144	195	361
Co-workers	Pers. -Qual.									206	144
	Pers. -Unqual.									160	250
	Impers. -Unqual.									210	448
Living Conditions	Pers. -Qual.										118
	Pers. -Unqual.										106
	Impers. -Unqual.										220
Job	Pers. -Qual.										
	Pers. -Unqual.										
	Impers. -Unqual.										

TABLE VI

MEDIAN INTER-AREA CORRELATIONS FOR EACH ITEM TYPE

	Initial Test	Retest
Personalized-Qualified	.155	.161
Personalized-Unqualified	.259	.193
Impersonalized-Unqualified	.307	.256

alized-Qualified and the Personalized-Unqualified item types show approximately equal test-retest reliabilities for two attitude areas (see Table IV). For the other three areas, the Personalized-Unqualified item scales are slightly less reliable. The Impersonalized-Unqualified item type consistently shows the lowest test-retest reliabilities. Again the hypothesis seems to be partially supported.

Area Intercorrelations—Hypothesis III states that the five areas of job satisfaction would show the greatest independency for the Personalized-Qualified types, with the Personalized-Unqualified and Impersonalized types showing greater dependency in that order. Table V shows all the intercorrelations of the three item types for the five job satisfaction areas.

To examine Hypothesis III, median correlations of the five attitude areas for each type separately were computed. This was done for the initial testing and retesting separately (see Table VI). The median inter-area correlations suggests that Hypothesis III is substantiated.

Conclusions

The Personalized item type appears to be superior to the Impersonalized item type in terms of the statistical characteristics examined in this study. Regarding the two forms of the Personalized items, differences are not too conclusive for the Qualified and the Unqualified phrasing on internal consistency. However, on test-retest reliability and independency of attitude areas, the Qualified form seems superior. For purposes of diagnosticity, this is important (1). In general, the evidence suggests that if the attitude object lends itself to all three types of phraseology, it would seem that the Personalized-Qualified type of item phrasing is the best.

REFERENCES

1. Bennett, G. K. and Doppelt, J. E. "The Evaluation of Pairs of Tests for Guidance Purposes," Educational and Psychological Measurement, VIII (1948), pp. 319-25.
2. Rundquist, Edward A. and Sletto, Raymond F. Personality in the Depression: A Study in the Measurement of Attitudes, Minneapolis: University of Minnesota, 1936.
3. Schmid, John, and others, Analysis of Job Satisfaction, AFPTRC Research Report, TN-57-30, March 1957.

JOURNAL OF EXPERIMENTAL EDUCATION
(Volume 29, Number 1, September 1960)

MOTIVES IN SELECTING ELEMENTARY AND SECONDARY SCHOOL TEACHING*

GERHARD LANG
Fairleigh Dickinson University, Teaneck, New Jersey

SEVERAL STUDIES have sought to determine motives for teaching. Recently, Lloyd-Jones (14), Chaltas (3), and Lang (11) have surveyed the relevant previous research. Interviews (8, 16), questionnaires (1, 5, 8, 17, 19, 22, 31), and essays on the theme "Why I want to teach" (7, 32) were the devices most frequently employed. Generally, in view of the critical teacher shortage, the direction of these studies was focused on finding answers to immediate problems, rather than on testing hypotheses derived from theory.

Theories of vocational choice, the concept of the multi-dimensionality of the teacher role, and studies of teacher personality provide a theoretical framework for research in this area.

Personality is considered to be an imporant determinant of vocational choice (21, 24), which is, to a large extent, an expression of basic psychological needs (6). Studies have shown that there are personality characteristics which differentiate between (20) as well as within (10, 15) professional groups.

It is generally recognized that the modern teacher plays many roles inside the classroom (18, 23). At the elementary and at the secondary level, some roles more than others tends to be emphasized. For instance, the elementary teacher confronts her pupils predominantly as a mother-substitute, whereas the secondary teacher, in her role of subject-matter specialist, functions primarily as director of learning. It seems reasonable to assume that one of the important reasons why women select one rather than the other level of teaching is the fact that they like the activities associated with the teaching role appropriate to that level.

The findings of studies of teachers' personalities (15, 25-27) and teachers' classroom behavior (28, 29) suggest that teaching serves as a distinct outlet for certain psychological needs and that these may differ for individuals who elect to teach at the elementary or secondary level.

The purpose of this study was to determine to what extent these differences, if any exist, are reflected in the motives for choosing the teaching profession. Motives for teaching were operationally defined as : (a) reasons comprising the Lang Scale of Motives for Teaching and (b) psychological needs measured by the Edwards Personal Preference Schedule.

Two hypotheses were tested: (a) elementary teachers will emphasize motives relating to the mothering aspects of teaching, (b) secondary teachers will emphasize motives relating to the academic and intellectual facets of teaching.

Subjects, Instruments

The subjects of this study were 101 female elementary and 87 female secondary teachers, 21-29 years of age, and currently teaching in 16 New York City public schools. Their experience ranged from one month to 10 years.

The Lang Scale of Motives for Teaching (12) and the Edwards Personal Preference Schedule (4) were the data-gathering devices of this study.

The Lang Scale measures the degree to which (i.e. "least", "slightly", "half/half", "much", "most") each of 25 reasons has influenced a subject to choose teaching. Checklists used in previous investigations listed reasons such as "I like working with children" which may be considered to be generally admired and socially desirable. In constructing the Lang scale, an effort was made to include reasons, such as "I like to be in a position of authority", which evoke varying degrees of social approval. Judgments of 60 people, 18 educators and 42 non-educators were used in determining the social acceptability values of each of 76 potential reasons for teaching, in accordance with Thurstone's method of equal appearing intervals (30). The bases for selecting 25 reasons for inclusion in the scale were (a) the assumed appropriateness of the reason for either

* Based, in part, on a doctoral dissertation (11) submitted to Columbia University in partial fulfillment of the requirements for the Degree of Doctor of Philosophy.

the elementary or secondary level of teaching and (b) the usual criteria governing the development of a Thurstone-type scale (30).

The Edwards Personal Preference Schedule, consisting of 210 pairs of statements, is designed to measure the relative importance of 15 psychological needs based on the subjects' self-descriptions. Each pair of statements is matched approximately for mean social desirability value, as previously judged by 86 men and 66 women, in order to minimize the effect of social desirability on item choice.

Procedure

The subjects were asked to complete a brief background questionnaire and then to consider the degree to which each of 25 reasons has influenced their choice of teaching as their profession. They were asked to check three reasons which were most influential in their choice, three reasons which were least influential, five reasons which were slightly, and five reasons which were much influential. The nine remaining reasons were those considered to be about half/half influential in their decision to teach. The EPPS was administered with the standard instructions printed on the test booklets. The data of subjects who incorrectly responded to the Scale of Motives and/or received a consistency score of less than 10 on the EPPS were not used. The two instruments were responded to anonymously.

Results

1. Both elementary and secondary school teachers rated as most influential reasons which are socially acceptable; they rated as least influential reasons which are socially unacceptable. All rank difference correlations obtained between social acceptability values of the reasons and frequency of checkings by subjects in the two response categories were significant at better than the .001 level of significance.

2. Elementary teachers emphasized the reasons "I like working with children" ($X^2 = 14.86$, $p < .001$) and "I like to give to and to receive love from children" ($X^2 = 12.97$, $p < .005$).

3. Secondary teachers emphasized the reasons "I like the continuous opportunity to learn" ($X^2 = 6.77$, $p < .05$) and "I enjoy the intellectual fellowship of other teachers" ($X^2 = 20.11$, $p < .001$).

4. Elementary teachers manifested a greater n·Nurturance ($r = .23$, $p < .001$) and lesser n·Achievement ($r = .12$, $p < .05$) than did secondary teachers.

5. None of the other motives differentiated significantly between the two groups of teachers.

Discussion

Findings of past research implied that, generally, teachers state reasons for teaching which might be considered socially acceptable. However, the validity of this deduction has not been shown. Previous investigators were not concerned with social acceptability per se as a factor to be studied. Generally, their subjects had not been given the opportunity to respond anonymously, a fact which may have been instrumental in their volunteering primarily socially desirable reasons. Furthermore, in most studies, teachers were confronted with a limited array of reasons, most of which were of a socially acceptable nature. In this study, the subjects responded anonymously to a scale comprising a wide variety of reasons which were selected on the basis of psychological theory. Social acceptability values were accurately determined and not arbitrarily inferred.

The results show that teachers, even when promised anonymity, will emphasize socially acceptable reasons for selecting teaching. In this respect, elementary and secondary teachers are alike. Apparently, teachers are either reluctant and/or unable to admit the powerful sway of motives which are socially less desirable. In private communications, teachers will agree that teaching is a convenient job for a woman. Yet only 19 teachers (10%) regarded this reason as most influential in their choice of teaching despite the fact that this motive ranked in the middle of the social acceptability continuum. On the other hand, the reason "I like working with children", which ranked highest on the continuum was checked by 116 teachers (62%) as being most influential.

The avoidance of less desirable reasons is probably a reflection of the conforming behavior which our society imposes on teachers, who, in their role as surrogates of middle class morality, may be reluctant to admit to motives which are at variance with the established values of society (2, 13).

Preference for the socially desirable reasons may be also attributable to the fact that most of the subjects may have been unable to acknowledge the potent influence of some of the less desirable reasons in their choice of teaching. They may, for instance, not be able to recognize that a need to express hostility is, unconsciously, responsible for their vocational choice. And yet, Jersild (9), and Symonds (29) have noted that the expression of hostility in the classroom is a widespread phenomenon which serves as a defense against the teacher's own anxiety.

In a recent study, Jersild (9) has elicited a variety of additional intrapsychic problems experienced by teachers, such as loneliness, the

search for life's meaning, sexual conflicts, and lack of the freedom to feel. The majority of teachers who responded to his questionnaire accepted the idea that a major goal in education should be to help young people to understand and accept themselves. Furthermore, the vast majority of teachers saw the necessity of their growing in self-understanding and welcomed the opportunity to discuss personal and emotional issues confronting them in workshops, special courses, and group therapy. The process of self-discovery on the part of teachers involves, among other things, a recognition of their motives for teaching and an understanding of their personality needs. Even though certain motives may appear to be somewhat far fetched or repugnant, they may nevertheless be strong factors in their choice of a teaching career.

The Scale of Motives for Teaching which has served as a research instrument may be useful as a tool in counseling pre-service as well as in-service teachers. In discussing their responses to this scale, teachers may be helped to "face themselves" by examining their motives for teaching and, in doing so, may better understand their personality needs.

The hypothesized differences in motives between female elementary and secondary teachers were supported. The findings suggest that possibly one important reason why female elementary teachers are attracted to teaching is that they like the activities associated with the teacher role of mother-substitute. They seem to like the companionship of children and to desire giving and receiving love from them. These teachers, apparently, like to treat others with kindness, like to be generous with others, and desire to have others confide in them about personal problems, characteristics which are associated with n Nurturance.

With regard to female secondary teachers, the data suggest that they see in teaching an opportunity to direct the learning of others, to pursue their own quest for knowledge, and to enjoy the companionship of intellectually stimulating fellow teachers. Apparently, they like to be successful, desire to be regarded as an authority, attempt to accomplish something of great significance, and strive to do things better than others, all characteristics indicative of n Achievement.

The apparent attraction of elementary teachers to the emotional and that of the secondary teachers to the intellectual facets of teaching does not imply that the latter do not want to establish warm personal ties with others. Teachers at both levels like to be with people and do not differ significantly in n Affiliation. However, female elementary teachers apparently like to relate to people who are relatively immature, who are receptive to love, and who are willing to reciprocate. Female secondary teachers, on the other hand, seem to prefer people who are relatively mature and who, on a reciprocal basis, can serve as outlets for their intellectual needs.

The finding of statistically significant differences in motives between female elementary and secondary teachers should not conceal the fact that there is considerable variability within each teaching level. Furthermore, in view of the selective nature of the sample studied—New York teachers—inferences to the population of female American teachers may not be warranted. Comparable studies, drawing upon samples in different localities throughout the country, are indicated.

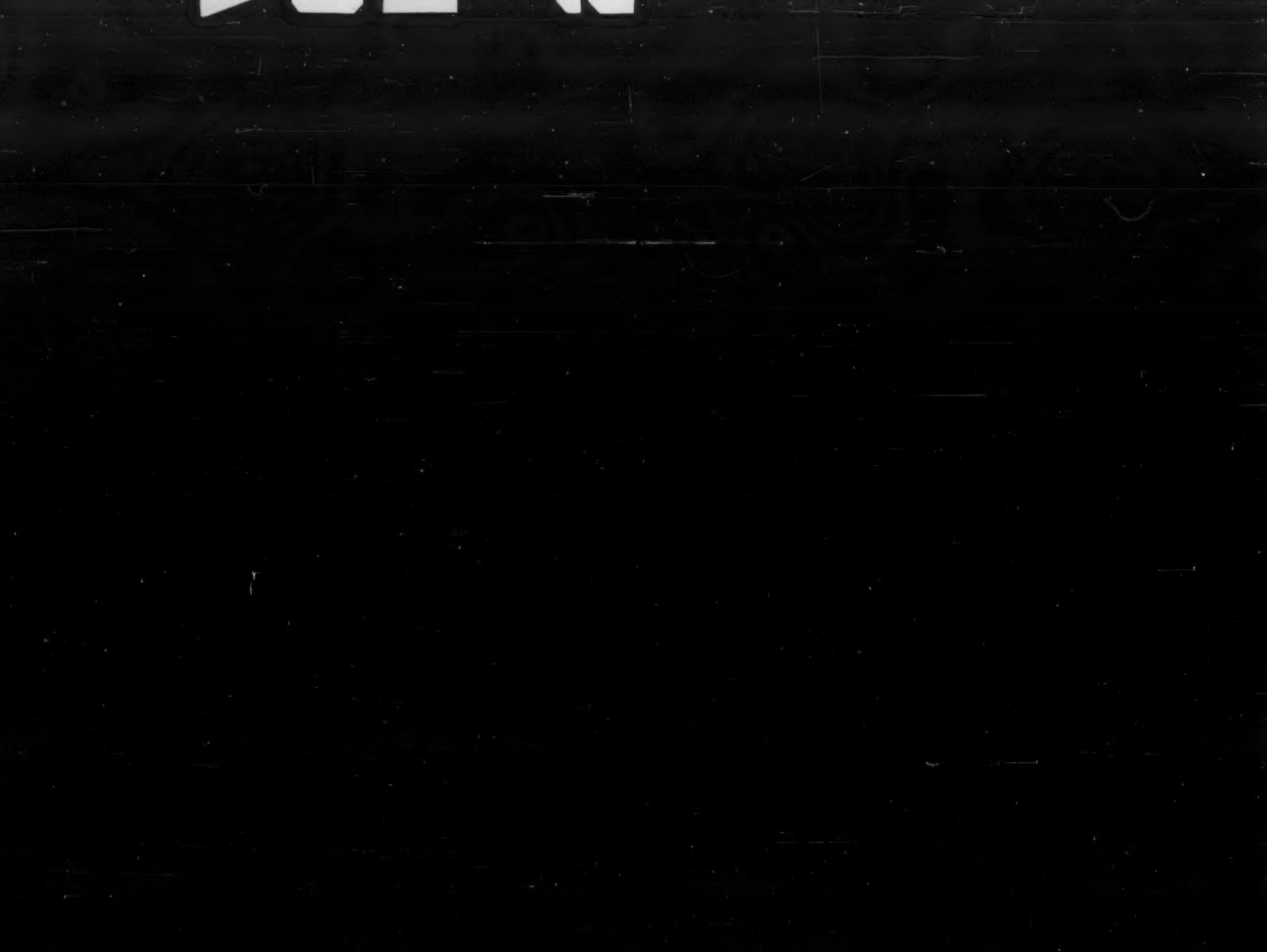
Summary

It has been suggested that teaching satisfies certain psychological needs and that these may differ for individuals who elect to teach at the elementary or secondary level. The present study sought to determine to what extent these differences, if any, are reflected in motives for choosing the teaching profession. The Lang scale of Motives for Teaching and the EPPS were administered to 101 female elementary and 87 female secondary teachers, 21-29 years of age, teaching in 16 New York City public schools.

Motives for teaching emphasized by elementary teachers related to the "mothering" role; those stressed by secondary teachers involved the "director of learning" role. Elementary teachers manifested a greater n Nurturance and lesser n Achievement than did secondary teachers. The two groups of teachers were similar with regard to the social acceptability of reasons perceived as influential in their choice of teaching.

The data support the view that female elementary and secondary teachers differ in some aspects of their personality. However, the differences found in the present study, though statistically significant, are not large enough to warrant a broad generalization.

BIBLIOGRAPHY

1. Best, J. W. "A Study of Certain Selected Factors Underlying the Choice of Teaching as a Profession," Journal of Experimental Education, 1948, 17, 201-259.
2. Brookover, W. B. A Sociology of Education, New York: American Book Co., 1955.
3. Chaltas, J. G. Factors Influencing the Choice Regarding a Teaching Career: a Review and Analysis of the Literature, unpublished Doctor's Dissertation, Columbia University, 1957.
4. Edwards, A. L. Manual of the Edwards Personal Preference Schedule, New York: Psychological Corp., 1954.
5. Fielstra, C. "An Analysis of Factors Influencing the Decision to Become a Teacher," Journal of Educational Research, 1955, 48, 659-667.

6. Forer, B. R. "Personality Factors in Occupational Choice," Educational and Psychological Measurement, 1953, 13, 361-366.
7. Hartford, E. F. "Why Two Hundred Chose Teaching," Phi Delta Kappan, 1948, 30, 126-127.
8. Hoyt, Mildred D. "Factors Which Influenced Pre-service Teachers' Choice of Elementary or Secondary Division," Dissertation Abstracts, 1955, 15, 1793 (Abstract).
9. Jersild, A. T. When Teachers Face Themselves, New York: Bureau of Publications, Teachers College, Columbia University, 1955.
10. Kelley, E. L. and Fiske, D. W. The Prediction of Performance in Clinical Psychology, Ann Arbor: University of Michigan Press, 1951.
11. Lang, G. Motives in Selecting Elementary and Secondary School Teaching, unpublished Doctor's Dissertation, Columbia University, 1958.
12. Lang, G. "An Experimental Scale to Measure Motives for Teaching," Journal of Educational Research, May, 1958, 687-694.
13. Lieberman, M. Education as a Profession, Englewood Cliffs, N.J.: Prentice-Hall, 1956.
14. Lloyd-Jones, Esther, and Holman, Mary V. "Why People Become Teachers," in L. J. Stiles (Ed.) The Teacher's Role in American Society, Yearbook of the John Dewey Society, New York: Harper, 1957.
15. Morey, E. A. "Vocational Interests and Personality Characteristics of Women Teachers," Australian Journal of Psychology, 1949, 1, 26-37.
16. Norton, J. L. "General Motives and Influences in Vocational Development," Journal of Genetic Psychology, 1953, 82, 263-278.
17. Ostlie, S. "Motivation for Entering Teaching," Journal of Teacher Education, 1956, 7, 80-81.
18. Redl, F., and Wattenburg, W. M. Mental Hygiene in Teaching, New York: Harcourt-Brace, 1951.
19. Ringness, T. A. "Relationship Between Certain Attitudes Toward Teaching and Teaching Success," Journal of Experimental Education, 1952, 21, 1-55.
20. Roe, Anne. "A Psychological Study of Eminent Psychologists and Anthropologists, and a Comparison with Biological and Physical Scientists," Psychological Monographs, 1953, 67, No. 2 (Whole No. 352).
21. Roe, Anne. The Psychology of Occupations, New York: Wiley, 1956.
22. Stewart, L. H. "Certain Factors Related to the Occupational Choices of a Group of Experienced Teachers," Peabody Journal of Education, 1956, 33, 235-239.
23. Stiles, L. J. (Ed.) The Teacher's Role in American Society, Yearbook of the John Dewey Society, New York: Harper, 1957.
24. Super, D. E. "A Theory of Vocational Development," American Psychologist, 1953, 8, 185-190.
25. Symonds, P. M. "Personality Adjustment of Women Teachers," American Journal of Orthopsychiatry, 1941, 11, 14-20.
26. Symonds, P. M. "Needs of Teachers as Shown in Autobiographies," Journal of Educational Research, 1943, 36, 662-677.
27. Symonds, P. M. "Needs of Teachers as Shown in Autobiographies," Journal of Educational Research, 1944, 37, 641-655.
28. Symonds, P. M. "Teaching as a Function of the Teacher's Personality," Journal of Teacher Education, 1954, 5, 79-83.
29. Symonds, P. M. "Characteristics of the Effective Teacher Based on Pupil Evaluation," Journal of Experimental Education, 1955, 23, 289-310.
30. Thurstone, L. L., and Chave, E. J. The Measurement of Attitude, Chicago: University of Chicago Press, 1929.
31. Wellbank, H. L. "Why Teach?" Journal of Educational Research, 1955, 48, 699-703.
32. Willcox, I., and Beigl, H. G. "Motivations in the Choice of Teaching," Journal of Teacher Education, 1953, 4, 106-109.